POPULAR BOATING

WORLD'S LARGEST SELLING BOATING MAGAZINE

OCTOBER, 1961

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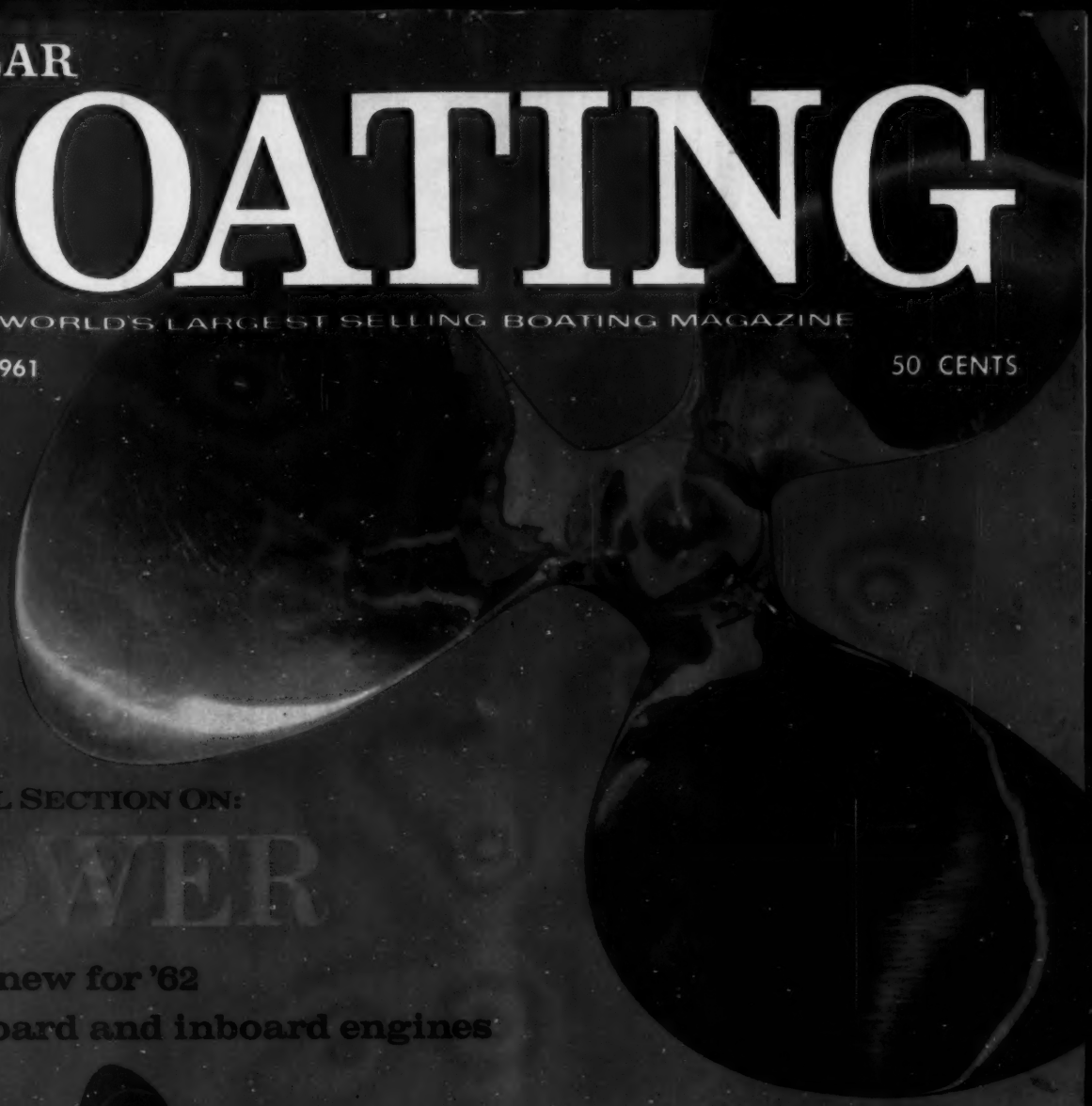

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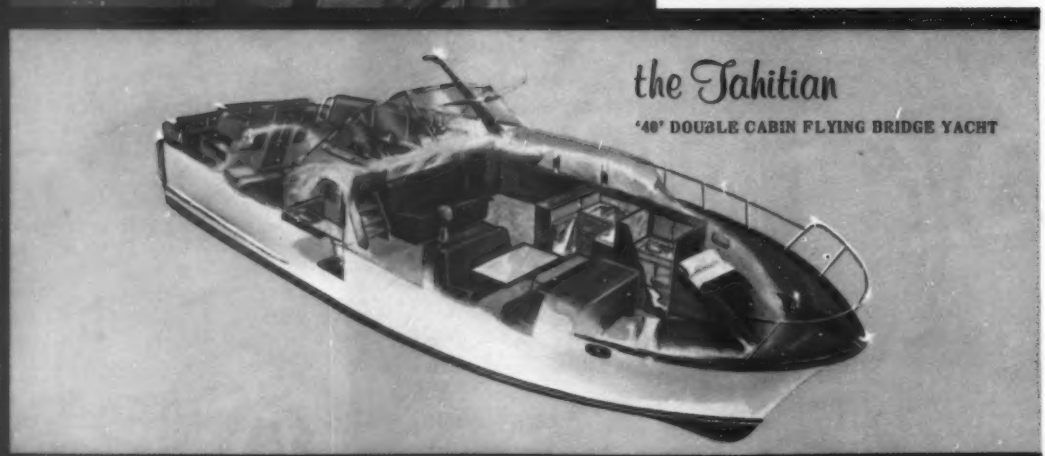

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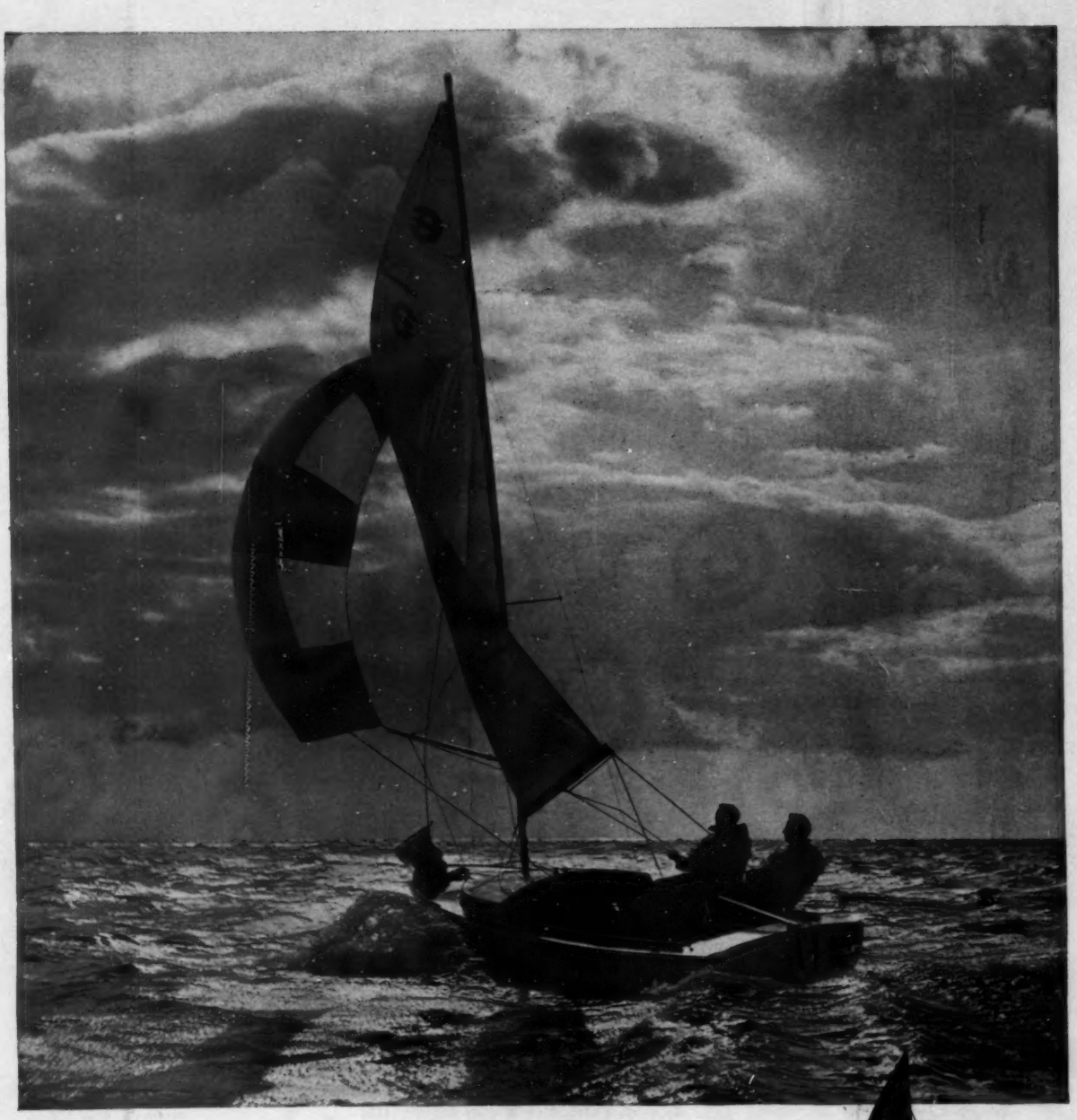

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BOATING

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OCTOBER, 1961

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The contents of this issue are dramatically symbolized in the dazzling shot of propellors by Al Gruen. See feature on page 34.

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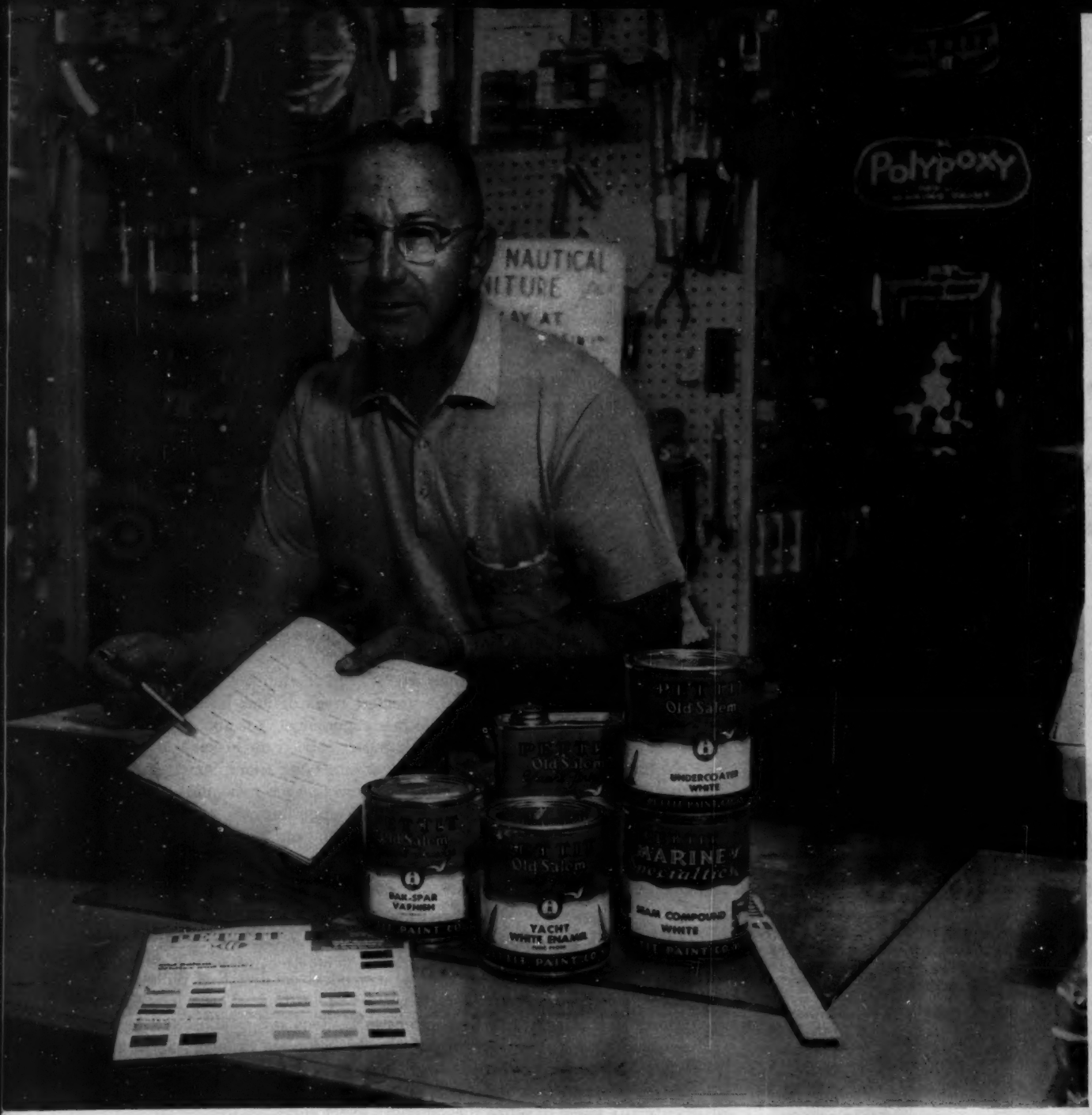

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NEXT MONTH

ON SALE OCTOBER 26

HEADING SOUTH

This annual southern cruising feature leads off with a rousing tale—"Phantoms in the Windward Passage" by noted boatman-author Carleton Mitchell. Also in this section will be latest information for boatmen who plan to charter and cruise the Bahamas and Caribbean.

•

BASIC NAVIGATION

Here is a short course in the basics of piloting with emphasis on how this applies to small boat owners as well as large. Read how to buy, how to use and maintain your compass, depth sounder and other vital navigational equipment.

•

REPORT ON INTERNATIONAL CATAMARAN RACE

•

POPULAR BOATING TESTS 42' CHRIS CRAFT

•

SEAMANSHIP QUIZ

How well can you read your chart? Check yourself with Elbert Robberson's carefully chosen questions coming up in the November issue.

FROM THE EDITOR—

No Place for Television

A short while ago we were attracted to a TV program on a major channel largely because it opened with some exciting shots of a new 55' cruiser. It didn't take many minutes for the cruiser to be hi-jacked. The members of a board of directors meeting on board were kidnapped, held for ransom, etc. The felons were eventually subdued when one of the captives unlimbered the ship's Very pistol. It wasn't much of a show but we aren't about to turn TV critic. The point is it's a sorry day when boating becomes the background for the tawdry gunslinging and blood letting type of programs that are rampant on TV. In the eyes of our children boating is a clean, unsullied sport, free from criminal connotations. It should be kept that way.

• • •

The Chilling Hand of Coincidence

In our September issue we published "Overboard For Boneheads," a story about a solitary fisherman who was pitched out of his outboard miles off shore in the Pacific. By the greatest freak of luck he rescued himself. This seemed like a once-in-a-lifetime experience. Yet about the time this issue came off the press, New York papers carried the account of a 15 year old boy who was tossed out of his boat into Long Island Sound and almost run down by his own rig. Fortunately he was saved in a split-second rescue by another boat. The coincidence grimly underlines the ceaseless demand for maximum safety precautions for young and old alike.

• • •

The Most Companionable Sport

The water, be it salt or fresh, is a magical catalyst that pulls together virtually everyone engaged in the sport of boating. There is a common interest and camaraderie that softens inhibitions and establishes a tacit understanding even between people who are complete strangers. This is why boats barge together in a harbor, why boatmen collect in conversational groups on a wharf and why, when winter comes, they gravitate to the nearest boatman's home to relive the summer's experiences.

In the same spirit boatmen have turned each month to POPULAR BOATING. We are modestly proud of the fact that we have more friendly readers than any other boating magazine in the world—a fact attested to by the Audit Bureau of Circulations which keeps meticulous tabs on all the copies sold by the nation's leading publications. (You'll see their seal on our contents page). We are also keenly aware of our responsibility to you and believe our plans for the future will strengthen more than ever the common interest we share in this companionable sport.

—Robert W. Carrick

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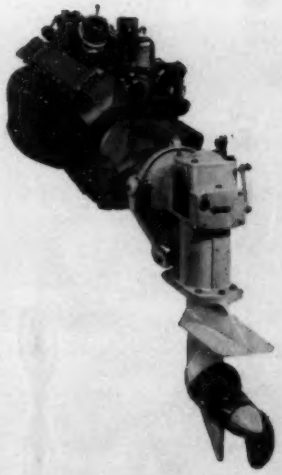

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JOHNSON ANNOUNCES

New! Outboarding's finest automatic transmission makes this The Sea-Horse That Shifts for Itself

Here's the first major breakthrough in outboarding since we pioneered the "V" engine. *It's Electramatic Drive—a revolutionary concept of automatic shift control—and it's exclusive with Johnson.* If you've ever handled a boat with a single-lever control, you can drive an Electramatic Sea-Horse right away. Otherwise, it may take you 30 seconds to learn.

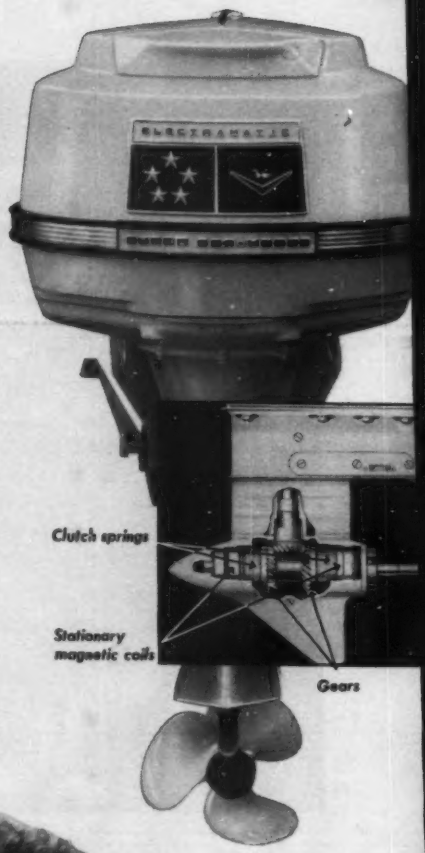
What makes this new Johnson system different? The transmission. You shift electrically . . . not mechanically. There are no clutch dogs whatsoever. A single electrical connection leads from the motor to the cockpit control station. It's simple. It's swift. It's certain!

Biggest gain is in performance. When an Electramatic Sea-Horse "shifts," the clutch engages electrically—so fast your eye can't see it move. Then instantly . . . silently . . . it spin-locks into rock-solid mechanical drive. The result: the same famous Sea-Horse sass with a new satin shift. Every skier will appreciate this.

This is not only the simplest and smoothest of all outboards ever. It's safe! You never have to take your eyes off of where you're going—to fiddle with separate levers or to punch buttons. Docking, especially, is a cinch.

This newest Johnson exclusive is available in both 75 and 40 hp models. And the control comes with the motor. You pay nothing extra!

The V-75 Electramatic is equipped with an alternator-generator. This charges your battery at idle and puts out 20 amperes at only 2100 rpm.



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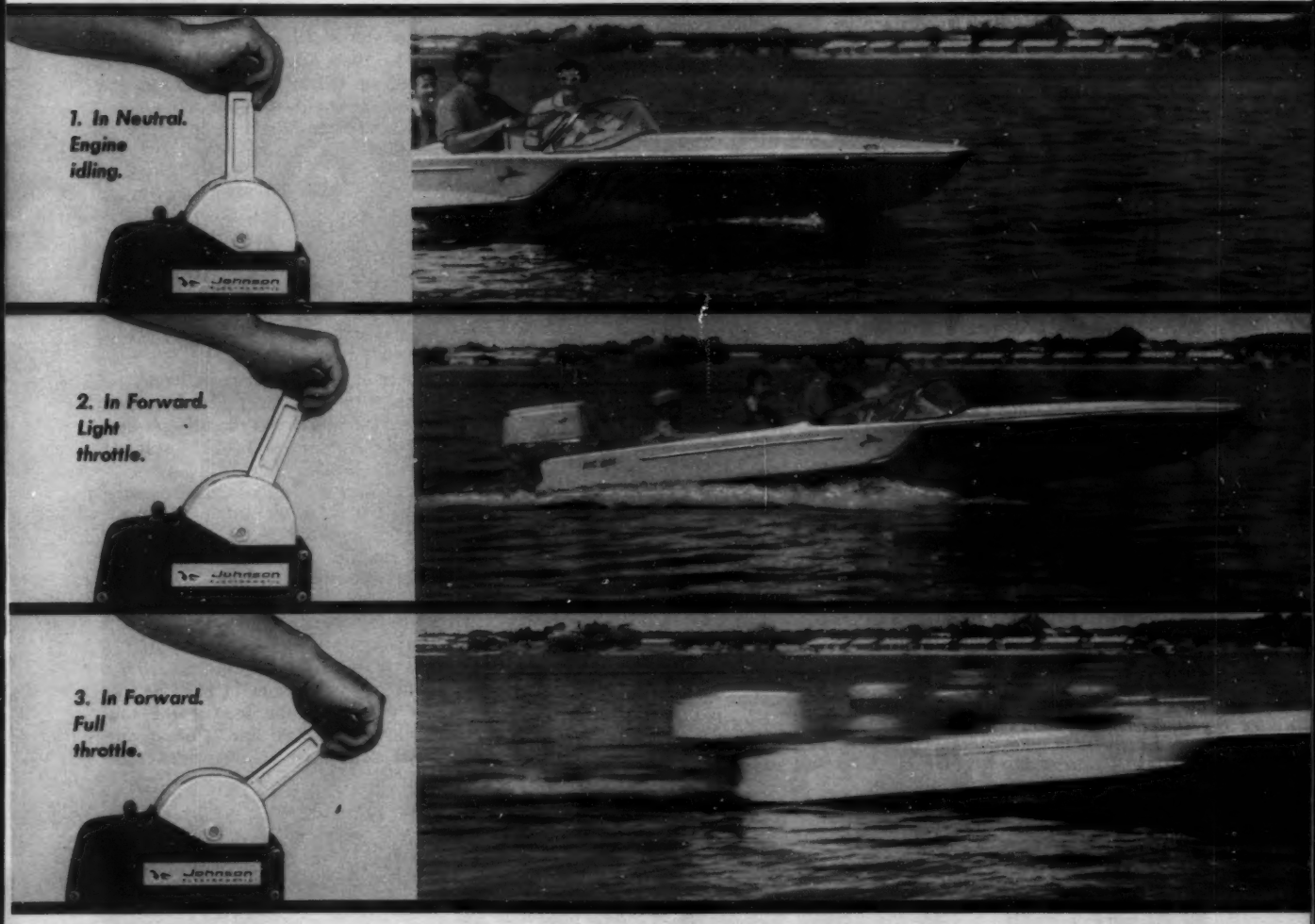
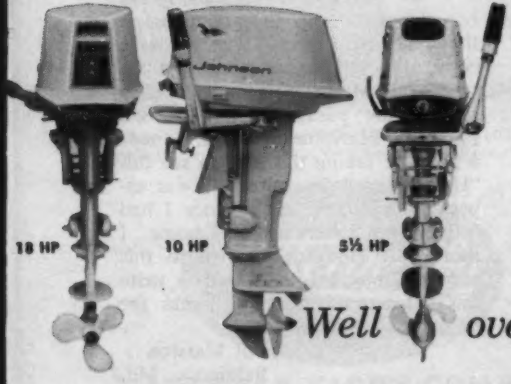


3 new Johnson Compacts...slimmer, simpler, same great Sea-Horse stamina!



Count on Johnson to bring the Compact trend to water. Now both smaller and lighter in weight, these three new fishermen's specials (at 18, 10 and 5½ hp) are still all Sea-Horse!

What's more, all three offer you practically all "big motor" features. Cushion-hub propeller protection. Full gear shift—forward, neutral, reverse. Sound-sealed hood. Thermostatically-controlled cooling system. Plus the toughest premium paint job ever.

All ten new '62 Sea-Horses — from sleek Electramatics to lean Compacts —are at your Johnson dealer's now. Why not plan to see him soon. You'll find him listed in the Yellow Pages. Johnson Motors, 1200 Pershing Road, Waukegan, Illinois. Division of Outboard Marine Corporation.

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READERS REPORT:

BOTTOM PAINTING

• In the August Here's How department, Ken Whitteker suggested that Mr. Pollock block up the keel to completely paint the underside of his boat while it was resting on a trailer. I hit upon an easier method than blocking up the keel. After I painted all the exposed surfaces, I tied one end of a line to a transom lifting ring and wrapped the other end around a tree trunk, after which I pulled the trailer far enough forward to expose the unpainted areas. The boat can be returned to the original position on the trailer by cranking the winch.

If Mr. Pollock doesn't have a tree handy, he might use any solid upright on his house or garage. He could even try digging his anchor in somewhere.

Gurney Williams
Chappaqua, N. Y.

ALL FOR SAFETY

• Your article on page 58 of the July issue entitled "Boating Becomes A Recognized Course In Seattle Schools," opens a very wide and interesting field. Articles assisting in care, maintenance and safety angles are excellent.

As President of the Queensland Council of the Australian Power Boat Association and Commodore of the Bundaberg Power Boat & Ski Club, I am particularly interested in safety and well-being of users of small craft.

R. E. Clemence
Bundaberg,
Queensland, Australia

We hope American boat associations were similarly impressed. Articles on maintenance and safety can never be over-emphasized. Look forward to a special story on boating education to appear in a forthcoming issue.—Ed.

SPEED RECORD

• Recently, I read in the newspaper that the United States is going to make an attempt at the world's speed record on water. Can you tell me more about what is being done?

Harry P. Henderson
Clairton, Pa.

The United States does have a boat that has been designed to surpass the world's water speed record of 260 mph held by Donald Campbell of England. Tests are presently underway and speeds exceeding 190 mph have been attained. The jet-powered hydroplane, called Miss Stars and Stripes II, was designed and built by Robert Beverly Evans and Les Staudacher.—Ed.

ADAMS CUP CORRECTION

• I should like to make a correction regarding your article on Pat Duane's winning of the Adams Cup which appeared in your June 1961 issue.

The 1960 Adams Cup national was sailed in O'Day Day Sailers at the Severn Sailing Association, Annapolis, which became the founding fleet of the Day Sailer Association.

Hans Gottschalk
Secretary, DSA

WEIGHTED STERN

• I have a 16-foot marine plywood runabout which has a fiberglassed hull. I have always had trouble with the motor coming out of the water on turns, with or without a water skier. After two years, two motors and cutting the transom to 14½", I still got the same results.

Last week a friend of mine suggested trying ballast in the rear of the boat. I put a surplus G. I. gas can full of fine sand in the stern and this completely solved the problem.

Another innovation I have made to the boat is a ski tow. I used ¾" steel rod bent square, and inserted it into ¾" pipes which I attached to the inside of the transom. I have an eye bolt welded to the top of the tow which takes the ski line. Considering that I made it myself, it works fairly well.

Ed Smith
Torrington, Wyo.

Did the ¾" rods really fit into ¾" pipes? —Ed.

BOATLESS BOATMAN

• My wife and I were visiting our two daughters and their families on the west coast when I ran across a copy of your August issue with the story on Marine Museums. After reading the paragraph on the San Francisco Maritime Museum, I made a point of taking the wife to see this "Undiscovered Treasure." It was especially enjoyable to me since I had to leave my 25′ cruiser back home. I thoroughly enjoyed the visit to this excellent museum and I had to write this letter to express my thanks for bringing it to my attention.

Bill Marston
Baltimore, Md.

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HERE'S HOW

Answers to Your Boating Queries

By Ken Whitteker

COVERING POLYSTYRENE HULL

What material can be used safely to fill dents on an expanded polystyrene hull? I intend to fiberglass the hull. Would resin adhere to dents filled with Durham's Rock Putty? Which type of resin can be used?

Leonard Wiggins
Sacramento, Calif.

I am not familiar with the formulation of Durham's Rock Putty, but any good polysulfide compound, of which there are many on the market, may be used for this purpose. I would suggest that you use epoxy resin for the application of a fiberglass covering to the hull. Keep in mind that the covering will add weight to the hull and lower the static water-line. This in turn will change the performance of the hull to some extent, unless you compensate by limiting the load you place aboard.

BARNACLE STAINS?

How do you get barnacle stains off a fiberglass boat?

G. S. Bennett
Olympia, Wash.

Barnacles usually cause a deterioration of the gloss of the outer plastic coating. When this occurs, the best remedy is to paint the surface with an epoxy paint to restore the finish. If a boat is normally left in the water long enough for barnacles to establish a home, a good grade of anti-fouling paint should be applied to the bottom.

SALTED BILGE

Would salt in the bilge be advisable and harmless as an anti-freeze to keep rainwater from freezing during winter storage, when the boat is laid up out doors?

I have had some trouble keeping rain and snow from leaking in during the winter, and feel this can be harmful to the hull if it freezes. On the other hand, a small accumulation of water in the bilge keeps the planks from drying out and the seams from opening.

This is a 30-ft. houseboat hull built like a flat-bottom skiff, with 1" solid mahogany planking. Bottom planks run lengthways.

Robert Peterson
Riverside, Ill.

The small amount of snow and rain that can leak into your hull should have no harmful effect in the winter. While salt will lower the temperature at which water freezes, it would not prevent freezing in near-zero or colder weather. Salt will help to prevent dry rot in warmer weather, but the spores that cause dry rot are not active in cold winter weather. However, use of salt cannot do any harm providing care is taken to see that the salt solution does not result in galvanic action between dissimilar metals with which it might come in contact.

CANOE STERN

I am planning to build a boat some 30 feet long for fishing and cruising in the southern Caribbean. Before I make final arrangements to get work started, I would like your opinion on two important points:

1. Which type stern is considered the better for reasonably rough water —transom or double end? Apart from the extra room obtained from the transom, what advantages has one over the other, and in what circumstances?

2. Is top grade pitch pine considered a good type of wood for boat construction? I have in mind outside planking particularly. If pitch pine is considered good, would you recommend coating, after construction, with some kind of plastic compound?

Frank V. Evans
Barranca, Columbia

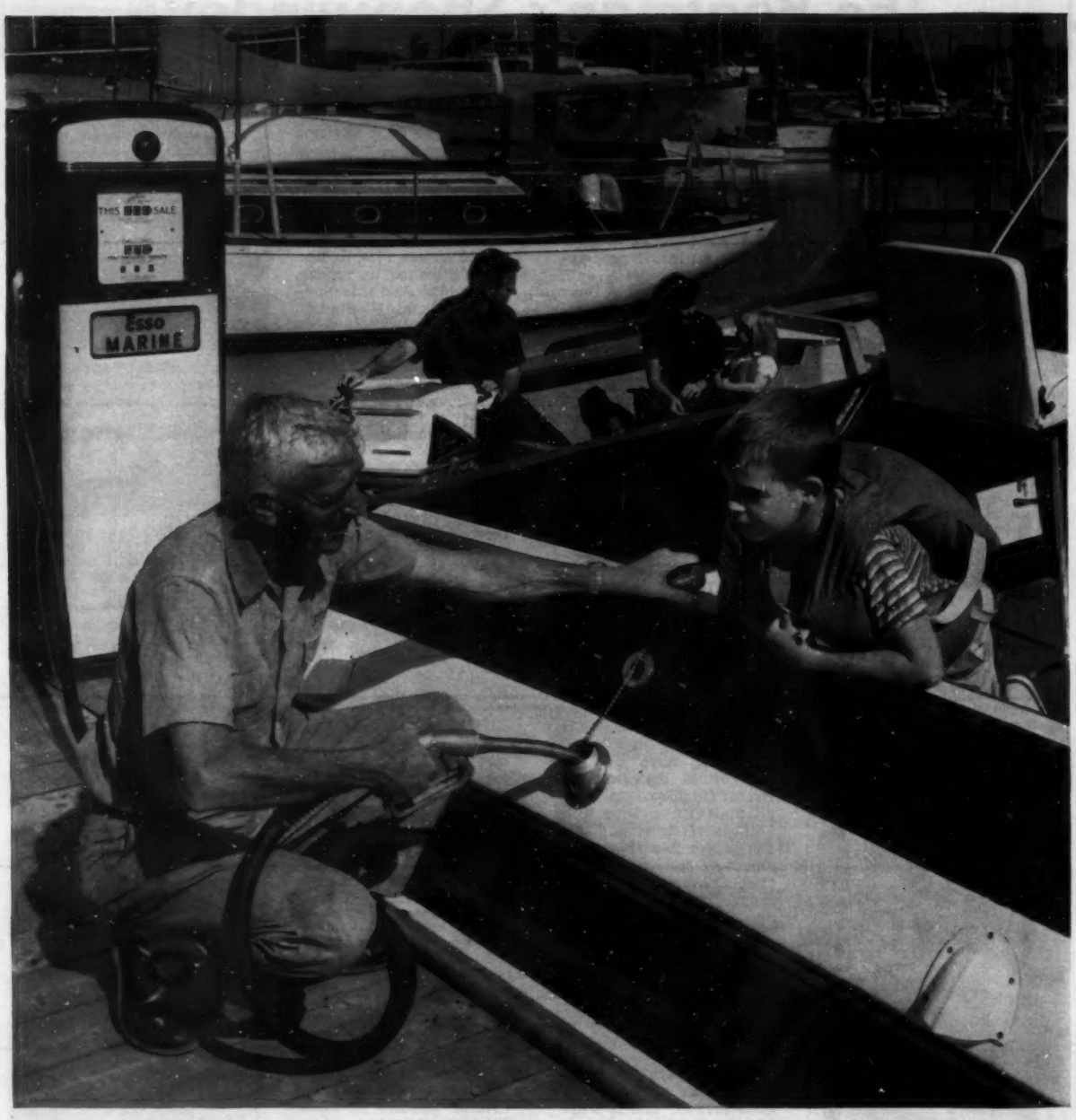
Where building economy is not important, the double end canoe stern is excellent for craft that are designed to operate at moderate speeds (7 to 8 knots for a 30-footer). For higher speeds, a flat stern with a transom is necessary for good performance.

I assume that by "pitch pine" you mean long leaf yellow pine. This is an excellent wood for planking and decking. It is rather expensive, and since you are considering covering with a plastic coating, a less expensive wood may be suitable. Since the boat is to be operated in tropical waters, the use of a plastic coating is desirable, if it is fiberglass reinforced. This would be impervious to teredos and other marine borers, and insures a watertight hull.

PORPOISE CONTROL

My 15-foot molded plywood boat is powered by a 40 HP outboard with a 10⅜" x 11½" propeller. With one person aboard, the motor operates at 4700 RPM and speed is 30 MPH, but the boat porpoises slightly. Changing tilt pin hole eliminates porpoising, but

(continued on page 113)



Right, Skipper! Esso Marine Gasoline is balanced to give both performance and economy. How? Through two special additives. One... MARNOL® fights gum deposits in tanks and fuel lines. The other... VITANE® fights gum formation in the engine and acts to dissolve deposits that may have formed on or around valves. Another thing. Esso Marine Gasoline gives quick starts, fast warm-ups, and has an octane rating which more than meets motor manufacturers' recommendations. This season, tie up at the Esso sign and really enjoy "Happy Cruising."*

*Trademark

HUMBLE OIL & REFINING COMPANY ESSO

The Boatman's Shopwindow

A 9′ DINGHY, molded of a single piece of polyethylene, has been developed by the Sin-Trex Division of Amos-Thompson Corp., Edinburg, Ind. The compact car-topper weighs 60 lbs. Price, assembled with mast, sail, hardware, is $375. Boat takes a 5 hp outboard.

AN ELECTRIC WINDLASS that is said to be so simplified that even the boat owner can install it, is being sold by Electrogard Inc., 238 Main Street, Cambridge 42, Mass. The model A5 has a 500 lb. line pull. Finished in bronze, it is $210.00 And this model operates on 12 volts DC.

CABIN LIGHT similar to that found in the home is possible with Boat-A-Lite made by Electr/Afloat Corp., 5715 S. Halsted St., Chicago 21, Ill. Model 106 operates on 6 v. DC or 110 v. AC and is $22.95. Model 112, at same price, uses 12 and 110 v. Dimensions: 5″ wide and 9⅝″ long.

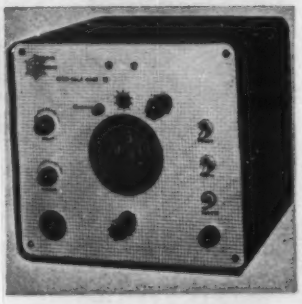
PORTABLE RADIO by Zenith Sales Corp., 6001 W. Dickens Ave., Chicago 39, Ill. is called the Super-Navigator, costs $99.95. Unit features a NAV switch for receiving sharp nulls so radio can be used as RDF for radio bearings. Power comes from the 6 "C" flashlight batteries.

MAGNETIC RETRIEVER is only 2″ x 2″ but is reported to have a plate pull of 40 lbs. Dan H. Brobst Co., Box 1305, Lincoln, Nebr. prices the Duncan retriever at $7.95. For bigger jobs they offer single or cluster magnets that, according to the maker, pull 70 to 490 lbs.

ELECTRIC FLARE is powered by cells which are inert until filled with water, and can be stored for long periods without deterioration. American-International Distributing Co., Box 20, New York 53, N. Y. sells the L-10 flashing flare for $19.95. The L-8 model sells for $5.95.

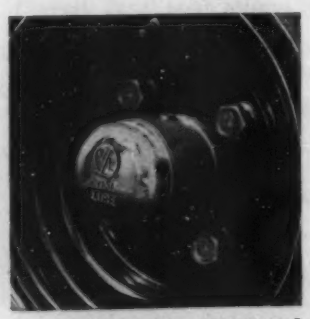
RADIO-TELEPHONE that is factory assembled and ready to install is made by Heath Co., Benton Harbor, Mich., and costs $319.95. The 50-watt unit has 5 crystal-controlled marine band channels. It operates on 12 volts and features a deck speaker for monitoring.

AUTOMATIC PILOT controlled by directional gyroscope provides automatically-held course in adverse weather conditions. Crozier Marine Division, 684 N. Prairie Ave., Hawthorne, Calif. makes the Mark VI, which is supplied with a 30-tooth sprocket for #35 chain.



FOOT THROTTLE brings automotive-type operation to boats by locating throttle on cockpit floor. Made by the Nicson Engineering Co., 4546 E. Washington Blvd., Los Angeles 22, Calif., the control has a built-in throttle return spring. Price is $30, which includes 10′ cable.

VISI-LUBE provides lubrication to trailer wheels thus eliminating rusted bearings. Oil level can be seen through plastic hub cap. Visi-Lube hubs are optional equipment on trailers built by Ace Welding & Trailer Works, 5304 Custer St., San Diego 10, Calif. Grease is eliminated.



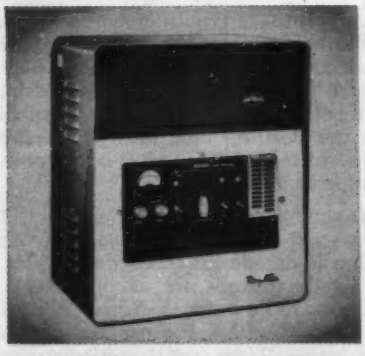
NOTES FROM CAPT. FRED'S LOG

RADIOTELEPHONES FOR DEEPWATER CRUISING

This year's "Transpac" was not only a racing classic; it also gives us a classic example of the widespread use of high-seas radiotelephone. Not many years ago the whole Transpac fleet was "lost" for the three weeks between San Pedro and Diamond Head. Nowadays when the Transpac racers are hull-down and headed for Honolulu we get a day-by-day report of the race, relayed to us from the high seas through the medium of modern marine radiotelephone.

THE HIGH-SEAS FREQUENCIES

High-seas radiotelephone has been in use for years aboard steamships and far-ranging commercial fishermen. Then deepwater yachtsmen discovered they could use it to phone their broker on Wall Street, or maybe their home in San Francisco—and this from as far away as Peruvian waters. While you must sit for a third-class license examination, high-seas radiotelephone requires little more savvy than the small boat radiotelephones most of us are familiar with already. Then what is the difference? Mostly the wavelengths used. Small craft radio employs Medium Frequencies (2-3 Megacycles)—transmitting a surface wave. Surface waves may travel about 100-200 miles in the daytime, or 300 to 500 miles at night using 150 watts power. It is possible to push a surface wave further by increasing the power; however, power is limited by law and practical limitations. Besides, there's another way to

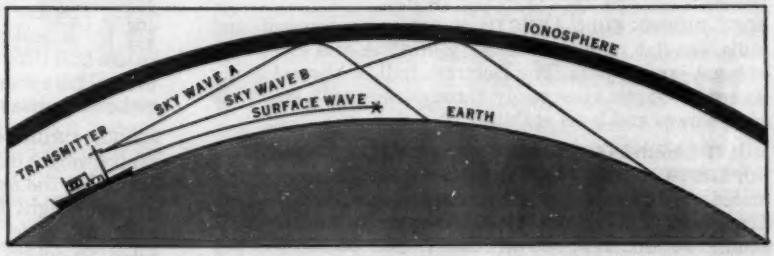


RAY 85X - a shipshape deepwater rig

get twenty times the distance with 150 watts: this is where the high-seas frequencies come in. These are between 4 and 22 megacycles—in the "high" portion of the frequency spectrum—and employ sky waves rather than surface waves. A sky wave heads for outer space, to bounce off the ionosphere and return to earth, much like a one-cushion billiard shot. Since sky-wave travel through the atmosphere varies between night and day, and from season to season, high-seas equipment employs different frequencies for different conditions: 17 mc and 22 mc are used mostly by day, 8 mc and 12 mc at night—always dependent on the time of year. You can see why it's a mistake to buy more power in the medium frequency range, hoping to increase your scope to high-seas operation. On the other hand, maybe the medium frequencies are all you need for an ocean race—as when you'll only be talking ship-to-ship. Your

RAY 1100 - a compact medium range set.

Raytheon dealer can advise you on the power you need, and what channels you should be using.



The surface wave follows the earth's curvature but loses a lot of its "push" in the process. Sky-waves require less power to travel longer distances as they bounce off the ionosphere.

SOME TYPICAL INSTALLATIONS

Raytheon's RAY 85X is a deepwater radiotelephone versatile enough for most yachtsmen's needs. Rated at 150 watts input, it has 11 crystal-controlled channels covering conventional ship-to-ship and ship-to-shore medium frequencies and all "high-seas" frequencies. While the RAY 85X has many advanced features (ask your dealer about the ingenious new squelch circuit in this one), it still operates with "Press-to-Talk, Release-to-Listen" simplicity.

If you don't plan any long-range ship-to-shore phone calls medium-range RAY 1100 is ideal for you. With 110 watts input power, this shipshape radiotelephone has 8 crystal-controlled channels in the medium-range frequencies. You can talk up to 200 miles under ordinarily favorable conditions—up to 500 miles at night.

With these, the Raytheon line of radiotelephones includes 11 models; they cover high and medium frequency ranges, with an ample choice of power. Raytheon also offers a Citizen's Band radiotelephone designed for marine installations. Not limited to marine use, Citizen's Band may interest you navigators of rivers, harbors and lakes. Ideal for many limited range applications in your car, home or boat. Your Raytheon dealer has all the facts.

OTHER ELECTRONICS FOR SAFETY

A radiotelephone is an important safety device, particularly when you're in need of help. But there are many other electronic devices designed to keep you clear of "rocks and shoals"—whether you're a deep-draft navigator or a Sunday skipper. Raytheon's full line of Marine Electronics includes Fathometer® depth sounders—both recording and direct-reading, Radio Direction Finders, Radar, Gas Detectors.

We've got to say "over-and-out" now—but if you'd like more on marine electronics for safety, see your Raytheon Dealer. If you can't locate him immediately, drop us a line—we'll send you his name and address.

Fred E. Lawton is Director of Safety and Educational Aids in Raytheon's Marine Department. He is a 30-year veteran navigator and professional skipper in all types of craft – from oceangoing steamships to racing yachts. He is a popular speaker on marine safety and navigation to boating groups and classes throughout the country.

RAYTHEON

RAYTHEON COMPANY
MARINE DEALER PRODUCTS
SOUTH SAN FRANCISCO, CALIFORNIA

First full story of that the boating

Here are the 13 factual reasons why the sensational BERTRAM HULL gives owners all the advantages of both planing and displacement hulls . . . with none of the disadvantages of either.

Now at last comes a hull so markedly superior in every factor by which a good boat is judged, that it is the talk of the boating world. A "boatman's boat", hailed as the first real breakthrough in revolutionary new hull design in modern boating history.

The phenomenal all-around performance of the new Bertram Hull — as judged by knowledgeable, critical experts, dealers and owners — is unequalled by any pleasure boat, of any size, at any price. In smooth water, or in the teeth of 6 to 8 foot head seas in a 30-knot blow. Amateurs, professionals and — most critical by far — yachtsmen who have owned many boats and award their judgment on performance rather than extravagant claims, declare that no matter what is asked of it, the Bertram is superb.

Read here the facts about the remarkable new Bertram Boats. And let the facts alone speak to you:

FULL LENGTH LIFT STRAKES. A main Bertram performance factor is the new-type strakes that sweep from bow to transom. Horizontally they act as steps, lifting the entire hull length to achieve high planing speeds. Vertically they act as small keels to help hold course.

SOFT-RIDING FULL LENGTH V-HULL. In conventional hulls, the flat planing afterbody hits the seas in a series of bone-jarring jolts. The Bertram hull, V-shaped along its entire length, runs easily through seas with effortless smoothness and level stability.

MULTI-LAMINATE HIGH-IMPACT FIBERGLASS HULL AND SUPERSTRUCTURE. In addition to unique design and amazing performance, Bertram features high impact fiberglass. This construction, the same as used in U. S. atomic submarines, can withstand over 30,000 lbs. per sq. in. Along the keel are 24 reinforced fiberglass laminations — 14 in the bottom, 12 in the topsides — bonded and "cured" by coat after coat of polyester resins and chemical catalysts. The result is an ultra-strong, rock-hard construction incredibly resistant to shocks, knocks and damage. With fiberglass superstructure, there are no seams to rot, nothing to need cabinetwork or joining.

UNBELIEVABLE LOW MAINTENANCE. Bertram fiberglass construction makes for remarkably easy, time-saving, work-saving and cost-saving maintenance compared to wood, metals and lesser quality fiberglass with uneven surfaces and rougher finish. Scratches, shallow nicks, gouges and small holes, which can permanently disfigure other hulls, are repaired with little time, trouble and cost. Major repairs such as punctures, breaks, and holes that penetrate the hull can be made in a fraction of the usual time, for a fraction of the cost needed for other types of hull materials and construction — with little or no visible trace when the job is done.

AMAZING NEW MANEUVERABILITY. No hull has achieved the uncanny responsiveness of the Bertram while maneuvering at slow speeds such as fighting a fish. The chines are above water where they cannot dig in to inhibit maneuverability. Twin rudders, of the type long used in racing, give positive, instant response at all speeds.

EXCEPTIONAL DRYNESS. Longitudinal strakes are specially shaped forward to act as multiple spray strips, throwing spray out low and flat to keep wind from blowing it back on board.

EQUILIBRIUM IN TURNS. At speeds over 30, most boats have to be put into a turn with care. Not so the Bertram. She banks crisply inward in perfect equilibrium, so that passengers are not thrown off balance. She is held from side-slips by the V-hull and vertical step-surfaces. With outboard chines clear of the water as she banks, she will not catch or trip on a wave, even on high-speed turns in a rough seaway, at maximum helm and full throttle.

HIGH SPEEDS IN ROUGH WATER. Conventional hulls achieve speed by planing action limited to a flat area aft. Bertram uses its full length V-hull for planing. The bow does not lift clear as speed increases; does not settle and plow even when throttles are cut while running wide open. The Bertram achieves speeds never before possible for a seakindly hull. As throttle is advanced the entire hull lifts, reducing wetted surface and minimizing drag. This minimized hull resistance is shown by the flat wake and absence of "rooster tail" astern.

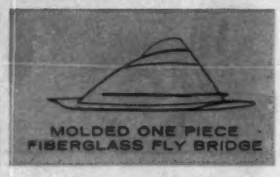
LEVEL CRUISING ATTITUDE. Porpoising comes from faulty weight distribution aggravated by waves. The bow lifts until the forehull comes up into the air. This unsupported weight forward then pulls the bow back down, and the cycle is repeated, producing uncomfortable pitching action. In the Bertram hull, lifting is evenly distributed along the entire hull. The result is a smooth ride even under choppy conditions.

MINIMIZED ROLL. Maximum stability and minimum roll are now possible through the inherent design of the Bertram hull. Rolling is dampened three ways. First, the full length longitudinal steps act as bilge keels. Second, while drawing no more water than conventional hulls, Bertram sits proportionately deeper and is less disturbed by surface waves. Third, the V-section angles develop a strong righting action as the hull heels.

HOLDS COURSE IN STEEP FOLLOWING SEA. A following sea is the ultimate test of any boat. Yawing makes for difficult steering. When a wave catches under a broad flat stern section, pitching the boat forward, her sharp forefoot or narrow entry acts as a forward rudder and she may broach all the way about. The Bertram deep V-hull, with no broad flat stern section or narrow entry, is so symmetrically balanced fore and aft that this does not occur, even when running notoriously bad inlets.

TROUBLE-FREE CLEANING. All that is needed to make a

the revolutionary new hull world is talking about



Bertram boat immaculate and ship-shape are plenty of water and a good washing down. A few minutes' turn-to gives a sparkling, new-looking boat from stem to stern. With belowdecks and cabin interior abounding in vinyl and formica, no paint or varnish is ever required.

HIGH RESALE VALUE. The Bertram is built to last. The combination of enduring Bertram multi-laminate high-impact fiberglass construction with the new design features of the revolutionary Bertram hull has produced a boat that will be functional and modern for many years after other boats are out of date.

Bertram 31's are now available in 4 31' models: Flying Bridge Sport Fisherman (shown here), Hardtop Sport Cruiser, Express Cruiser, and Convertible Sport Cruiser.

HERE THEN ARE 13 SUPERIORITY FACTORS WHICH LIFT THE BERTRAM HULL HEAD-AND-SHOULDERS ABOVE CONVENTIONAL BOATS. Singly or together, they represent every deciding factor by which the expert boatman chooses one boat over others.

Whether you plan gruelling blue-water fishing, leisurely cruising, or carefree family luxury in sheltered waters, you will ride in unequalled comfort, security and deep satisfaction. Your Bertram meets the most exacting demands for speed—yet satisfies the experienced yachtsman's requirements for seaworthiness, stability and dryness. Running before a following sea or across a choppy seaway—cruising in rough deep water or running a bad inlet—Bertram performance is in a class apart. Experienced boatmen, taking their first Bertram ride, can scarcely believe the all-around performance they have witnessed. No such hull has ever before existed. It is *exclusively* produced *(Pat. Applied For)* by Bertram, and cannot lawfully be duplicated, imitated or copied.

In owning a Bertram boat, you will own the boat which did not spring direct from drawing board to owners, but was tested and wrung out under conditions that would wreck the ordinary boat. You will own the boat that won the gruelling 184-mile Miami-Nassau Race under the worst conditions in its history. You will own the boat that won this year's 280-mile Around Long Island Marathon, averaging better than 43 MPH. You will own the boat of which owner Henry W. Valentine of Los Angeles wrote: "This past week-end in Newport Bay I was stopped by a number of other boats to enquire where she came from, who she was, and just to be admired." You will own the boat that earns from knowledgeable owners such unsolicitated letters as these:

"This is a great step forward . . . the boat is way ahead of anything on the market." —*Henry Mercer, New York.*

"It has performed beautifully . . . I notice a number of things that give evidence of careful attention to details . . . the boat has been an object of great interest and admiration around Cohasset. I'm not going to have difficulty finding passengers for rides to town."—*F. Gregg Bemis, Boston, Mass.*

"She is beyond description in performance and in styling. Patsy is most pleased with the decorating, and I am too . . . We are delighted."—*John M. Coward, Edgartown, Mass.*

" 'Stormy Petrel' was the talk of the coast coming up here. She is the finest fishing machine I have ever had my hands on." —*Capt. Tommy Gifford, Montauk and Key Largo.*

Obviously, *this is the boat the experts are buying.* Owners who have owned many boats like Dan Topping, James Kimberley, Briggs Cunningham, Hastings Harcourt, James P. Lewis, Dan Braman, Jr., professional fishing guides like Capt. Tommy Gifford and Capt. Tom Hamblin—yachtsmen who can choose and afford any boat, are buying Bertrams. Not every boatman, perhaps, is a prospective Bertram owner. It takes discerning boat-wisdom to appreciate her superb performance and quality.

Thanks to meticulous attention to every detail, every fitting, every aspect of family living afloat, she presents to the discriminating owner a degree of beauty, utility, and seakindliness never before obtainable. With one-piece hull construction no "working" is possible—no refastening or recaulking ever necessary. Owners are extravagant in their praise of the color-coordinated interiors and self-evident Bertram craftsmanship which have set a standard of excellence that others can only follow. The phenomenal Bertram sales record—the backlog of orders from the experts—are indications that sophisticated boatmen recognize in Bertram the boat which meets their most exacting requirements for speed, seaworthiness, comfort, family security, and sheer luxury throughout.

BERTRAM YACHT COMPANY

A DIVISION OF NAUTEC CORPORATION

The revolutionary new Bertrams will be on display at major boat shows. Top dealers are being appointed here and abroad. They will gladly demonstrate the Bertram 25 or 31 to qualified prospects. If no Bertram dealer is yet available in your area, write, wire or phone Bertram Yacht Company, 5502 N.W. 37th Avenue, Miami 42, Florida, NEwton 3-8011, and a showing will be arranged to fit your convenience.

Get Twice As Much for Your Budget... Buy Heathkit®, the Value Name in Marine Electronics

- Top Quality, Top Performing Units
- Big Savings—up to 50%
- Do-It-Yourself Kits, Guaranteed To Work
- Easy To Buy— No Down Payments

New Heathkit 3-Band Direction Finder with Consolan Coverage... just $109.95

- 10 transistor, 1 diode circuit
- Flashlight battery power supply
- Covers beacon, Consolan, broadcast and marine-telephone bands
- "Sense" antenna eliminates double null
- Preassembled tuning unit for easy assembly

For versatile radio receiving facilities with unusual economy, choose the new Heathkit "Mariner." It covers three bands *and* the new Consolan frequencies . . . has a normal bearing accuracy of ±3° . . . waterproofed 4" x 6" speaker for excellent tone . . . lighted dial and tuning meter . . . batteries last 500 to 1000 hours.

Kit MR-11 . . . 12 lbs. . . . NO MONEY DOWN, $11 mo. . . . $109.95

Kit MP-10 Power Converter $29.95

Kit MI-10 Depth Sounder $69.95

Assembled MWW-11 50 Watt Radio-Telephone $319.95

The Heathkit Marine Line is a Complete Line

Send for your FREE copy of the 1962 Heathkit catalog; it describes the Heathkit Depth Sounder, 50 watt Marine RadioTelephone, 3-Band Consolan Radio Direction Finder, Marine Power Converter, and more than 250 other units for stereo/hi-fi, educational, amateur radio, test instruments, and general interests. We'll send your friends a copy too!

Money Back Guarantee

The Heath Company unconditionally guarantees that you can build any Heathkit product and that it will perform in accordance with our published specifications, by simply following and completing our check-by-step instructions, or your purchase price will be cheerfully refunded.

Send for *Free* **Catalog**

HEATH COMPANY HEATHKIT

Benton Harbor 3, Michigan

Please send FREE 1962 Heathkit Catalog

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SEAMANSHIP

PRINCIPLES OF DOCKING

By Elbert Robberson

HANDLE your boat poorly out in the open and no great harm may result. But get awkward around a dock or slip, and you can lose paint, punch holes in topsides, and have onlookers talking behind their hands. Docking is no mere matter of steering the boat alongside; rather, a fine coordination of helm, engine, lines, and even the anchor may be required to do the job well.

The first thing you must do is to learn how your boat responds to rudder and propeller at different speeds, how quickly she will stop, what her turning circle is, and what happens when you go astern (does she swing to one side or the other, and can she be steered?). The best place to learn this, and to practice keeping your boat under control, is out in the open water. Get away from everybody, and drop a couple of buoys (cushions with weighted lines for anchors will do), and imagine that they represent the line of a pier face or the sides of a slip. "Come alongside" from different directions—with the wind blowing from ahead, astern, and broadside. Practice backing squarely between the markers. Become an expert where mistakes won't be dangerous.

PRELIMINARIES

The more you can prepare in advance, the better your landing will be. Look in your tide table to find out the stage of the tide; at low water there may be shallows to avoid. With a rising tide the current will be in one direction; with falling water, flow should be opposite. Double check by observing the high-water seaweed line on the beach or the amount of green growth showing on dock pilings or along seawalls.

Study the area on your chart, checking the depth of the water, the room you have for maneuvering, and the layout of the land and nearby structures. You can get an idea of the wind and current direction and relative force by the way in which anchored boats (preferably the same type as your own) are lying in the vicinity of your dock. Another clue is the tension and sag of dock lines of the boats that are tied up. Flags also show direction and strength of the wind.

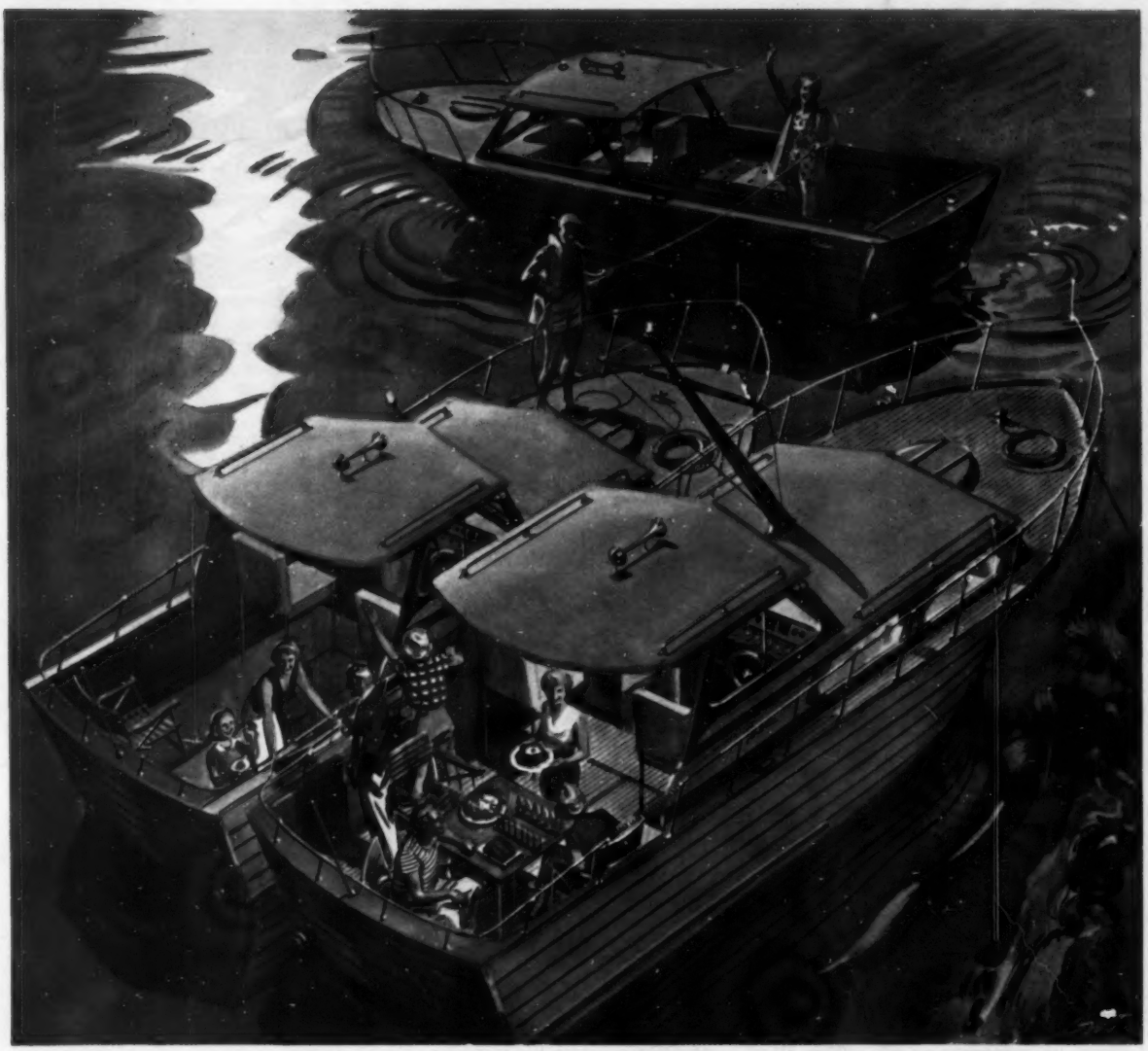
It is best to make your approach heading into the wind or current, whichever is exerting the most force at the time. Except where current is strong, the wind will probably be the predominant factor.

When you have decided on whether you will land port or starboard side to, put out fenders, break out docking lines, and make ready the boat hook. Designate crew members to handle the lines, and let it be understood that everyone else keeps out of the way and that no one tries to use hands, arms or legs as fenders. Make the approach slowly, so that any bumps will be easy ones. But you can't be timid about it because you must have some way on the boat to be able to steer it.

COMING ALONGSIDE

An apple-pie situation is when there is plenty of room at the dock and there is negligible wind and current. With an inboard boat, come up at about a 30° angle, get the stern swinging in by turning the rudder away from the

(continued on page 21)

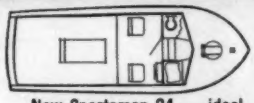


They're lap-straked right down to the deep, full-length keel for softer riding, easier handling.

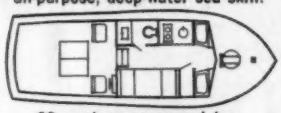
The fleet's in... *and Pembroke's way ahead!*

It's the beautiful all-new Pembroke fleet . . . a Sportsman 24, a 28 family cruiser and a beamy, 33 luxury model . . . all of them loaded with extras as standard equipment. And they're beauty personified — with graceful, sea-going lines, walk-around safety rails, teak or fiberglass decks, rounded transoms and handsome interiors.

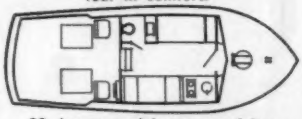
Every Pembroke hull is built of solid ¾" Philippine mahogany on air-dried, native oak ribs — every plank and timber *hand*-fitted with painstaking Yankee skill and care. Every strake is bonded with specially-formulated latex compound . . . *bolted* strake to strake and anchored to steam-bent ribs with silicon-bronze. No doubt about it — you'll get more than ever for your money in a 1962 Pembroke.



New Sportsman 24 — ideal, all-purpose, deep-water sea skiff.



28 cruiser accommodates four in comfort.



33 luxury model accommodates six in separate staterooms

Pembroke

AUTHORIZED PEMBROKE DEALERS

Hancox Marine Motors, Bath, Me.
Shelburne Harbor Shipyard, Shelburne, Vt.
Pembroke Marine, Port Lauderdale, Gilford, N. H.
Dan-Dee Marine, Wellesley, Mass.
Marine Sporting Center, Providence, R. I.
Brainard Marine Sales, Clinton, Conn.
Hibiscus Harbor, Inc., Union Springs, N. Y.
George W. Collins, Buffalo, N. Y.
Chapman's Boat Sales, Brick Town, N. J.
Pen-Mar Boat Yard, North East, Md.
Riggs Cruiser Sales, Washington, D. C.
Julius T. Herbst, Norfolk, Va.
Tramat Marina, Pompano Beach, Fla.
Huron Marine Park, Huron, Ohio
Al D'Eath Marine Sales, Detroit, Mich.
Masters Marine, Inc., Chicago, Ill.
Pembroke-Kent Co., Newport Beach, Calif.
John G. Rapp Co., San Francisco, Calif.
Skyline Marina, Ltd., Maple, Ontario
Long Island Pembroke Sales, Lindenhurst, N. Y.

PUSH-BUTTON BOATING IS HERE!

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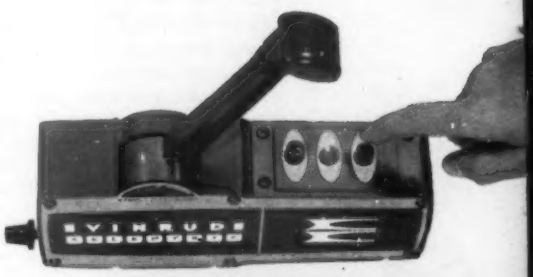

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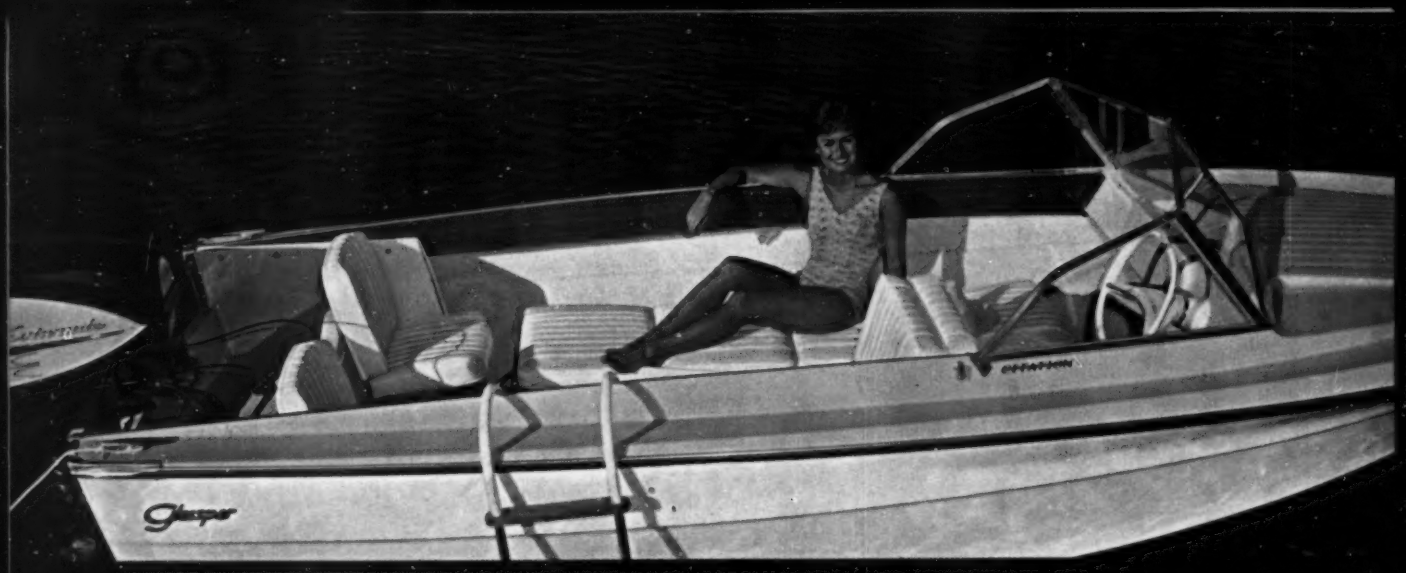

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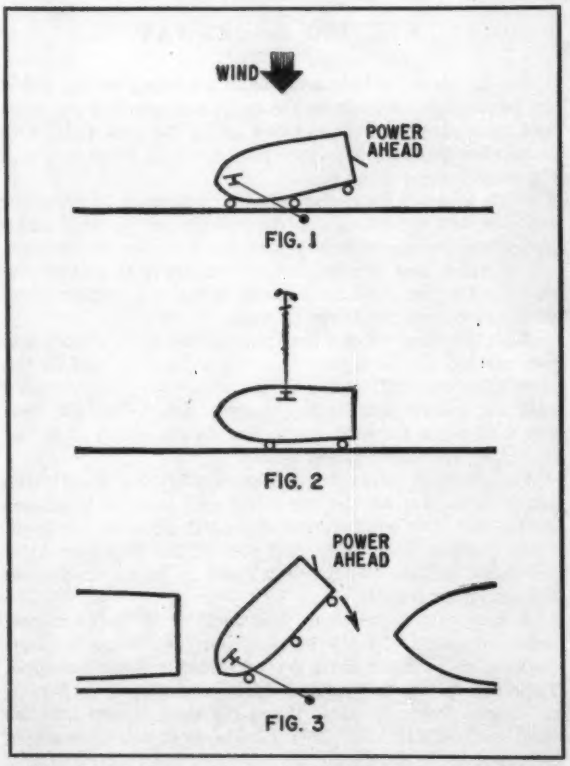
dock, and then apply just enough reverse to stop. Approaching starboard side-to, come in at a flatter angle and, if necessary, give the boat more of a swing than you would if you were docking port side-to. This is to offset the tendency of the propeller to push the stern to port when backing down.

Get your lines out immediately. If you are short-handed, and cannot secure all lines simultaneously, give first attention to the line that is upstream or upwind (whichever predominates). This will keep the boat from swinging away from the dock.

When it is necessary to make a landing with a strong wind or current from astern, more reverse will be required to check the way on the boat, and it is a good idea to get the stern line out fast.

With the wind blowing onto the pier face, approach at a large angle and have a fender over the bow, as well as on the side. When the bow is near the dock, use reverse to prevent the wind from making the boat hit with too much force. If the wind is not too heavy, you can let the stern, cushioned by fenders, swing in by wind power.

A strong breeze can sweep the stern in too fast for safe-



How to maneuver when wind is blowing on the dock.

ty. You can counteract this by snubbing the bow with a spring line led well aft, and "jetting" the stern away from the dock by going ahead with the engine, rudder turned away from the wind. This is shown in *Fig. 1.*

If you must lie on the windward side of a dock for any length of time, it is a good idea to drop your anchor well off as you come in, and secure it to a cleat amidships, as illustrated in *Fig. 2,* to hold the boat out. Under boisterous conditions, two anchors, one for the bow and one for the stern, will give more protection.

Now, suppose you must get into a very small space, like that in *Fig. 3.* Go almost directly in (near a right angle) and bring the boat up to a fender over the bow. Get out an after-bow spring line and push the stern in by applying forward power with rudder turned outward.

(continued on next page)

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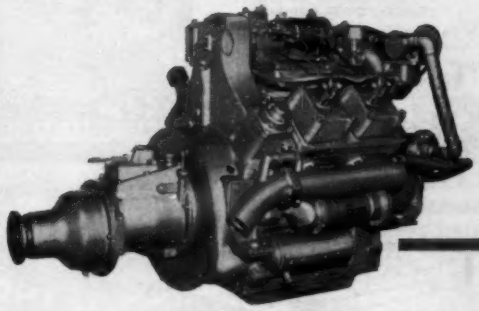

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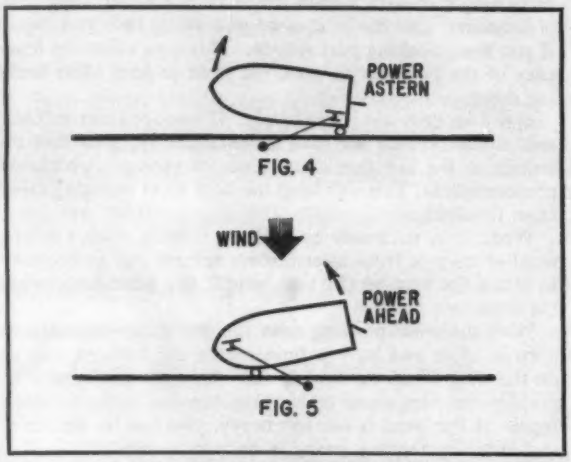


Use of spring lines in getting underway.

GETTING UNDERWAY

Try to "drive" a boat away from a landing as you would an automobile away from the curb, and you'll leave paint and, maybe, pieces of planking along the pier face. This is because the stern is pushed into the dock when you turn the rudder away from it.

With a small boat, the sensible maneuver is to shove the bow out far enough so the rudder can be held amidship when getting underway forward. You can do the shoving by hand, foot or boathook. A heavier boat, or one that is pinned to the dock by a strong wind, will require more power than you can apply by hand.

With the wind off the dock, or coming from ahead, you can cast off the bow line, hold the stern line, and let the bow drift out sufficiently to get clear by going forward with the rudder amidship. Another way to get the bow out is to use a forward spring line on the stern, as shown in *Fig. 4*, and apply power astern.

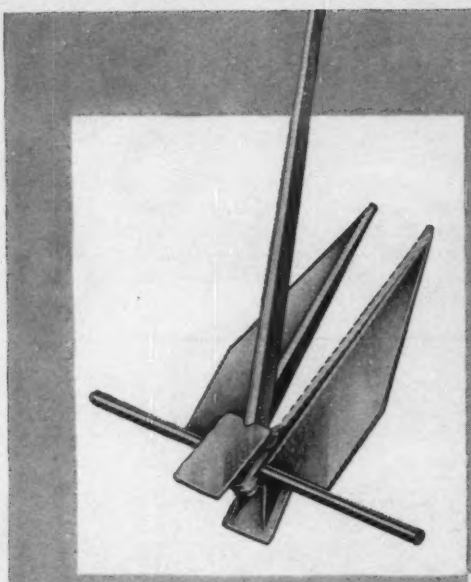
The simplest way of getting off with the wind from astern is to cast off the stern line and hold an after-bow spring line. The wind should swing the stern out by itself. Then you can back away, and cast off the bow line when you have enough maneuvering room to go forward without getting in trouble.

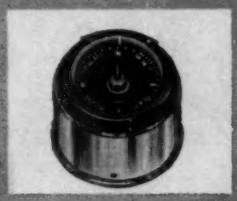
A boat that is held onto the dock by the wind is best taken off astern. To get the stern out far enough to allow backing, cast off the stern line and hold an after-bow line. Turn the rudder toward the dock, as pictured in *Fig. 5*, and apply power forward. When the stern is well into the wind, cast off and back down briskly, until you have ample clearance to go forward.

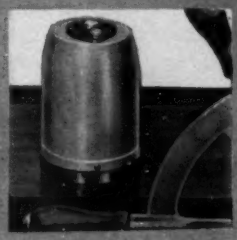
GETTING INTO A SLIP

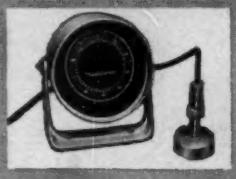
If you are lucky enough to have a slip with a few boat-lengths of turning room, there is no problem. Just remember that some boats turn most easily to the right, and their stern swings left when backing down. If your boat is one of these, right turns require the least space and wheel twirling, so get into your slip by turning right if possible, even if it means making a full circle.

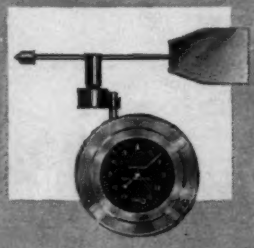
The process of making the shortest possible turn is to apply hard right rudder with power ahead. This gets the stern swinging left. Then reverse just enough to kill the way *without changing the rudder angle*. Then give another blast ahead, killing the way with a touch of reverse. Repeat the process as many times as necessary to get the boat headed where you want. *(continued on page 24)*











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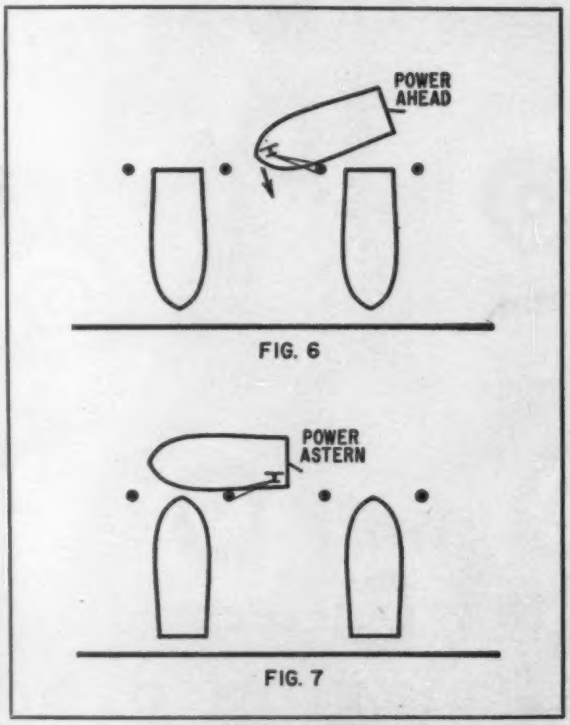
SEAMANSHIP *(continued)*

In many marinas, space is limited, and you aren't given much extra room for maneuvering. Suppose that you moor bow first in a slip which must be approached from the side. You can make a "ferryboat landing," trusting to fenders and helping hands to avoid adjacent boats. But *Fig. 6* shows a more reliable method of keeping the situation under control and turning the boat into a slip with the least trouble. Use an after-bow spring line around the near piling of your slip. Turn the rudder toward the slip and use forward power.

Backing into a mooring space is a little harder, but you can still keep control by using a spring line. *Fig. 7* shows the method. Bring the boat up alongside the far piling of the slip, stop the boat, and run a forward quarter spring line around the piling, then back down. The boat will pivot around the pile and line up stern first in the slip.



Lines to rig when entering a slip

GIVING A SLIP THE SLIP

Leaving a slip is much easier than getting in because you are leaving a restricted space for one that's more roomy. However, in really tight quarters, it may be necessary to use spring lines to get headed in the desired direction as the boat leaves. In this situation, the method of *Fig. 5* can be used for a boat departing bow-first, and *Fig. 7* would apply to a boat that must back out of its slip.

When lines are to be let go, as is the case with the spring lines that have been discussed, and bow and stern lines of a boat that is soon to leave, it is a good idea to loop the line around the piling or dock cleat with both ends on the boat. Then you can let one end of the line go and pull it in by the other without outside aid.

The secret of easily mooring a boat is to take all possible advantage of the power, not only of your engine, but also of the wind and current, to move the boat wherever you want her to go. Although there are many ways of accomplishing this, the above methods contain the main principles and can be used as a starter. From this point on, practice will make you an expert. Put in a little practice every time you use the boat, and you'll be able to hold your own with no difficulty. — ⚓

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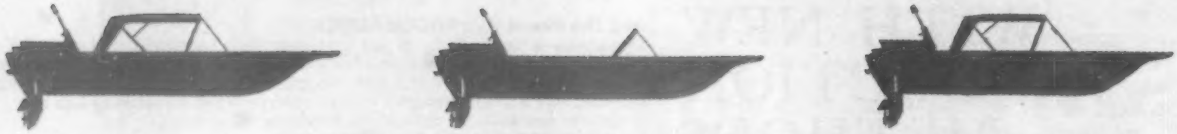
See October Issue of Motor Boating for information on the complete 1962 PACEMAKER line.



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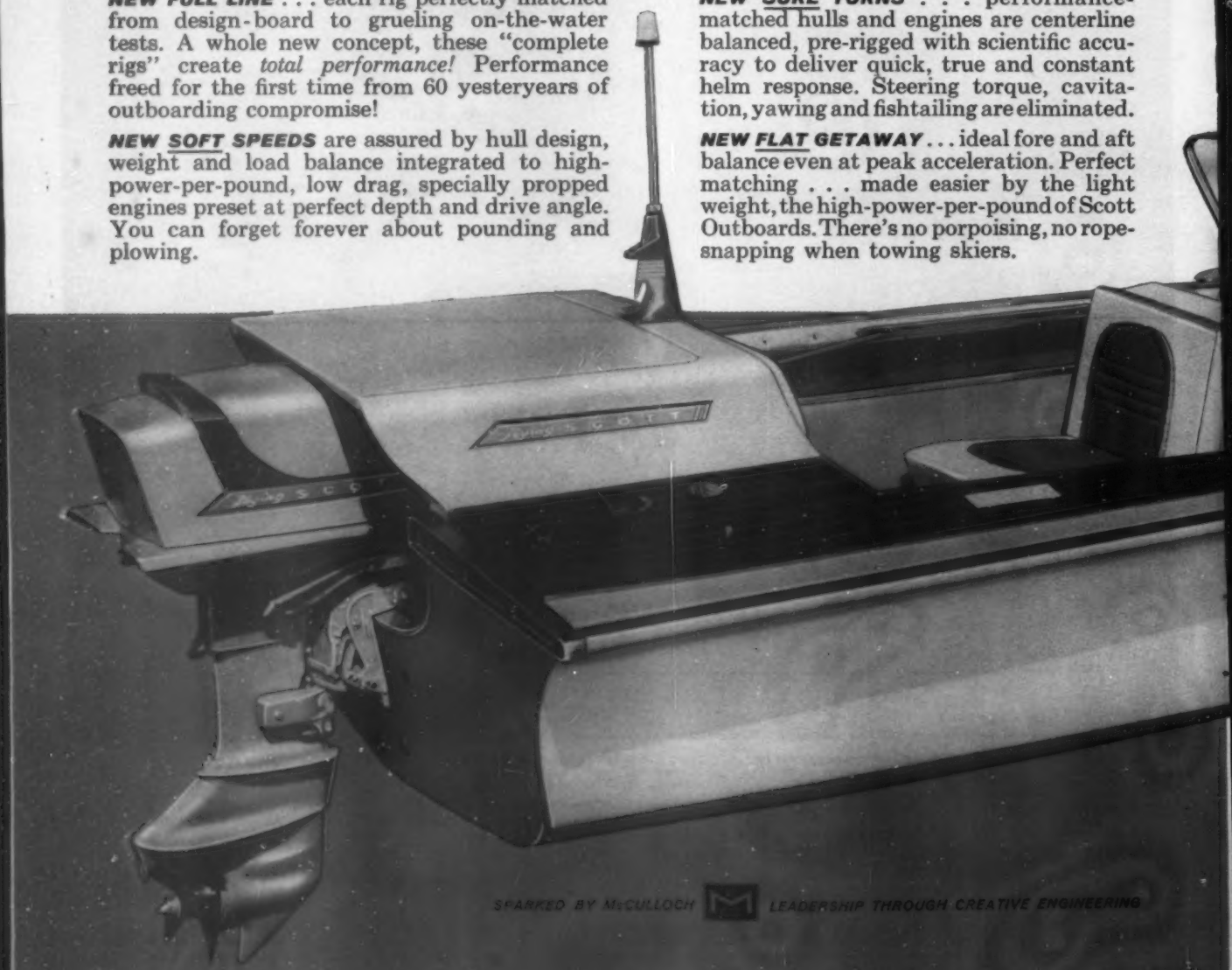

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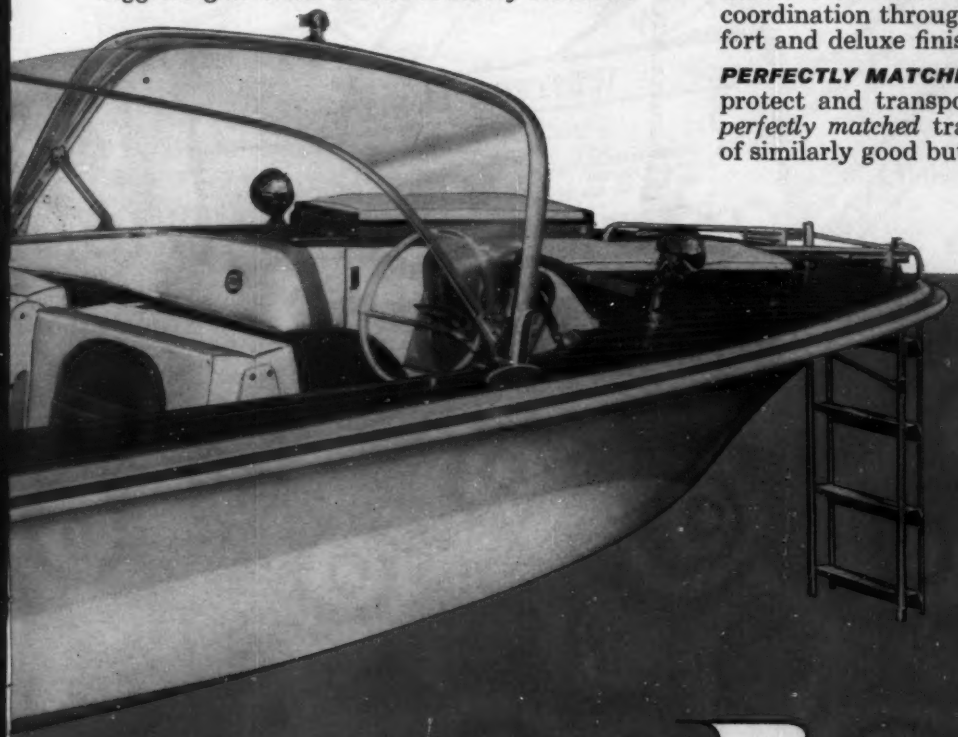

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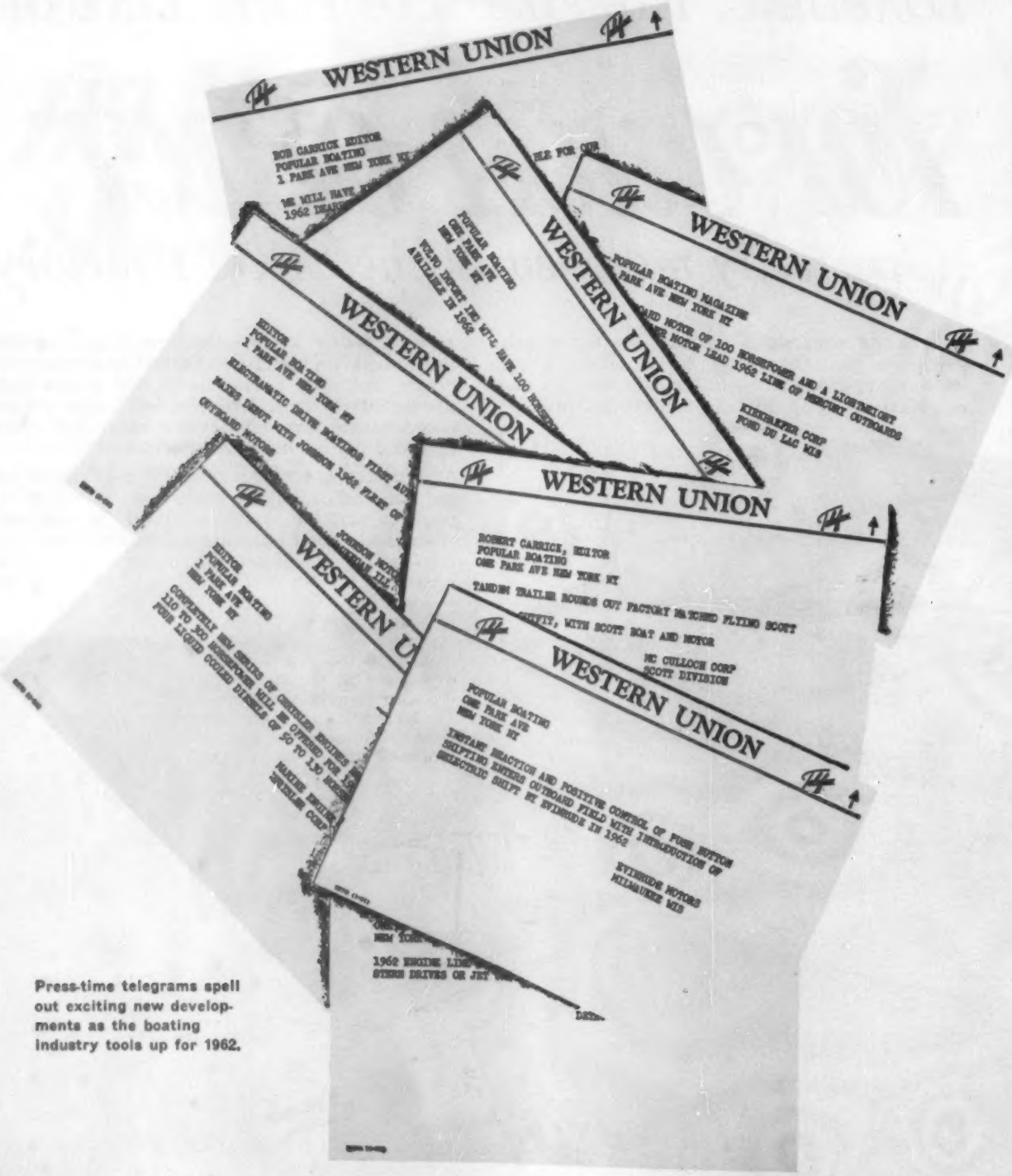


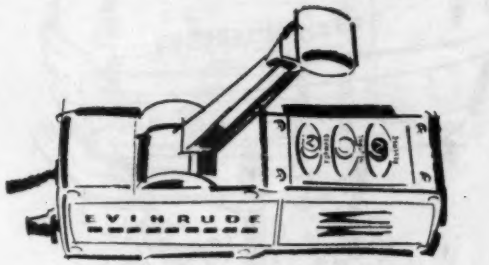
Press-time telegrams spell out exciting new developments as the boating industry tools up for 1962.

ON 1962 ENGINES

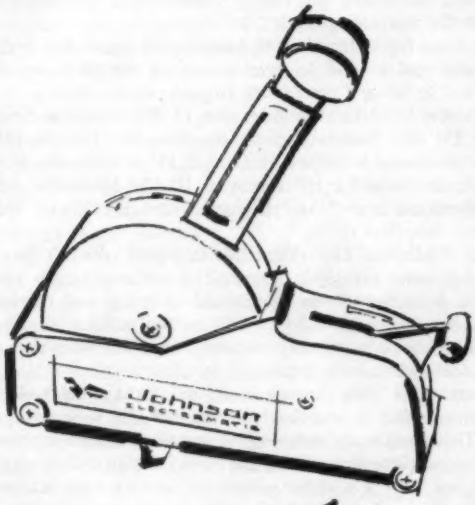
By Tom Bottomley

ELECTRIC shifts, new models, hydraulic transmissions, remote tilt mechanisms for lower units and outdrives—these are all new developments in outboard and inboard engine lines for 1962. This is a refreshing change from recent years when redesigned cowls or new colors were all that many manufacturers offered in their "new" lines.

This year every major outboard manufacturer has something new. This goes for several inboard makers, as well. Let's take a look at the outboards first.



Finger-tip control



Throttle-shift combo

CHANGES IN OUTBOARDS

BUNDY MARINE. A 300 cc model is now offered, a scaled-down version of last year's successful 500 cc model, which is still available. The 300 is made only in manual start version, while the 500 includes electric start, manual rewind, and an emergency starter rope. The 500's specially-designed duplicate valves, set into the motor block, have been incorporated into the new 300 cc model. Both engines have a recirculating system which scavenges unburned lubricant from the crankcase and pumps it back to the top main bearing; then discharges it through the lower unit.

In line with Bundy's policy of "no change for the sake of change," the 500 cc engine is identical to the 1961 model in appearance except for a slight lightening of the basic color. Internal improvements have been made to this Italy-built engine, the company reports, to bring it closer to mechanical perfection.

EVINRUDE. Electric push-button gear shifting is the big development here, and it is available on deluxe models of the 75 HP Starflite IV and 40 HP Lark IV. Throttle can

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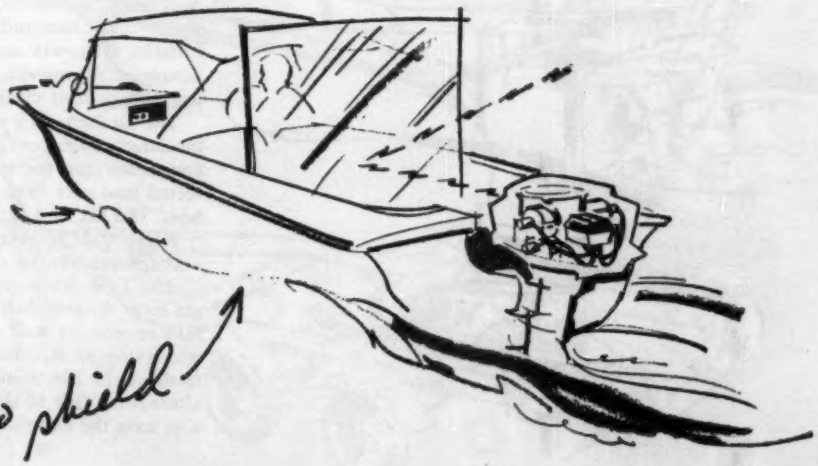
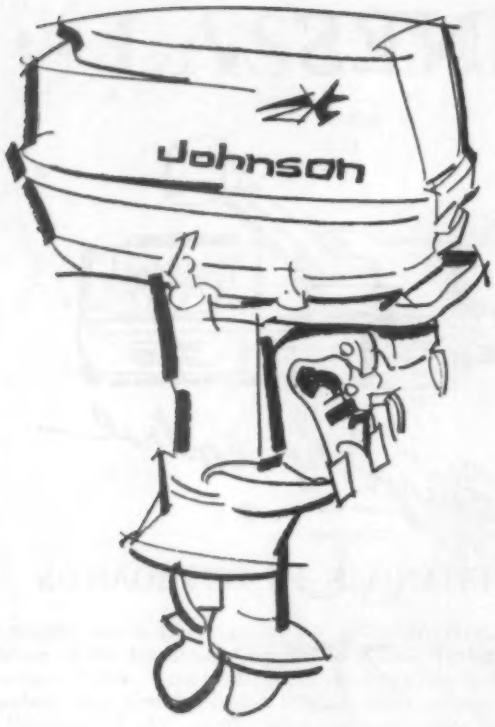


Radio shield



Two new 28's

1962 ENGINES *(continued)*

be set, and instant shifting from forward to reverse or vice-versa can be accomplished without going through neutral. This is said to give instant response and maneuvering agility for docking or other close-quarter operating conditions. Electrically-engaged spring clutches are operated by the push buttons to allow gear-shifting at higher engine speeds than would be possible with standard shifting cogs.

A 28 horsepower engine is also new in the Evinrude line. This model, the Speeditwin, is offered to fill the gap between Evinrude's 18 and 40 horsepower motors. The Speeditwin is a relatively lightweight motor that can be used to tow water skiers, or to explore a variety of fishing locations on a lake with a minimum loss of time.

Another development is an electric tilt mechanism that can be controlled from the dash to raise the lower unit on 75 horsepower models. The motor can be tilted to any degree, allowing the boat to be run through weeds or shallow water. Reversing the switch on the dash restores the motor to the normal operating position.

Powerhead for Evinrude's 40 horsepower motor has been redesigned, and is said to give smoother operation at all speeds, and to absorb even more rugged usage.

Evinrude's 1962 line includes the 75 HP Selectric Shift Starflite IV and Standard Shift Starflite IV; the 40 HP Selectric Shift and Standard Shift Lark IV models; the new 28 HP Speeditwin; 18 HP Fastwin; 10 HP Sportwin; 5.5 HP Fisherman; and 3 HP Lightwin and Ducktwin, the latter with weedless drive.

GALE PRODUCTS. What this company doesn't have is their big news for 1962. Gimmicks, ornamentation and expensive frills have been eliminated to bring about price reductions ranging from $5 to $60 on the various models. The pricing move, according to company officials, is aimed at the quality-conscious, economy-minded buyer.

One exclusive Gale feature is the quick-disconnect electrical system that is standard on the 60 HP V-Sovereign motor. This speeds up both engine installation and service.

Gale's complete line offers the V-Sovereign 60 in electric versions with or without generator, or with rope starter; Sovereign 40 in electric models with or without generator; Buccaneer 40; Buccaneer 25 in electric or manual start models; and manual-start Buccaneers in 15, 5 and 3 horsepower models. All motors from 5 to 60 HP are equipped to take remote controls, and feature improved silencing in both the powerhead and underwater exhaust. Gas tanks and propellers are standard equipment with all Gale engines.

A radio shielding kit is now available from Gale. It is designed to reduce radiation of electrical impulses from the motor that cause radio disturbance, the company reports. Initially Gale will market this for their V-Sovereign and Sovereign 40 motors, but the basic design is adaptable to any two or four cycle motor.

The kit includes a shielding cover for the distributor cap, insulated covers for high tension ignition cables, a new type suppressor cap for the spark plug connection, and a protected lead wire from the motor connection to the junction box. The kit, at $29.50, will be sold through Gale dealers.

JOHNSON MOTORS. Electric shifting, a 28 HP engine, and remote-control electric tilt are all new for Johnson. Unlike Evinrude's push-button system, Johnson uses a single lever throttle-shift that feeds fuel when drawn backward into reverse as well as in forward gear. This new shift, which uses an automatic clutch, will be standard equipment in the V-75 Electramatic engine, which also has a built-in alternator. One of the three Sea Horse 40 HP motors will also have the electric shift.

The 28 HP Johnson is the first new Sea-Horse power classification in three years. It will have power to spare for water skiing, according to the company, and will still be effective at lower speeds for fishing.

Johnson's power tilt consists of a battery-operated hydraulic pump that is fastened to the right side of the stern bracket. One of the standard shock absorbers is replaced with a combination shock absorber and hydraulic cylinder. Wiring from the motor to a switch on the dash completes the rig. This tilt device can be installed on Johnson's previous 75 HP engines.

For their 18, 10 and 5.5 HP motors, Johnson has relocated fuel pump, fuel filter and intake silencer to make a lower silhouette possible.

As an accessory, Johnson has introduced a "current coupler" which permits use of two direct current generators simultaneously, as when two Electramatic 40 motors are used in a dual installation. Each of these motors has its own built-in 10 ampere D.C. generator. Without the current coupler one or the other of the two voltage regulators in each generator would tend to "override" the other, causing it to cut off the generator before power to the battery was completely restored.

The ten models in Johnson's 1962 line include the Electramatic 75 and standard electric-start 75 HP motors; Electramatic 40, electric start 40 and manual start 40 HP Sea-Horse engines, and manual start 28, 18, 10, 5.5 and 3 HP Sea-Horses. Electric starting kits are available for the 28 and 18 HP motors.

KIEKHAEFER CORPORATION. Mercury Motors has led the field for years in top horsepower offerings, and for 1962 does it again with its Merc 1000, the first 100 HP outboard entry. Although no higher than earlier six-cylinder Mercs, it has a new cylinder block with 90 cubic inch piston displacement. Gears, rods and pistons are also new, and the lower unit has been beefed up to take the additional power.

Cylinder head design for the 100 HP motor is said to "squish" the explosion in the combustion chamber. According to the company, this results in greater power with more

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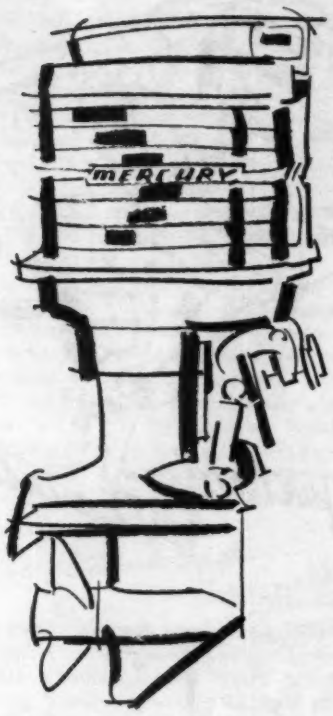
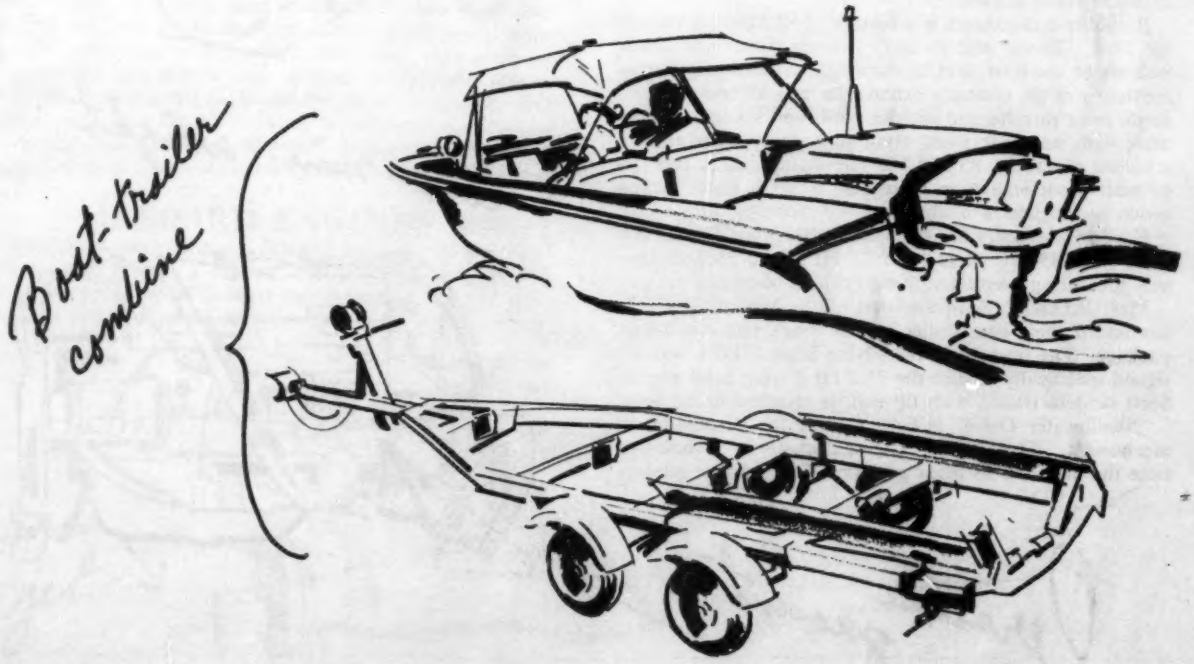
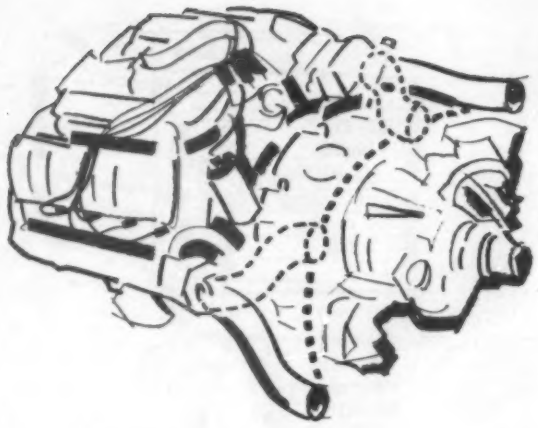


Now! 100 H.P.



Boat-trailer combine



Adjustable exhausts

1962 ENGINES *(continued)*

efficient use of fuel. Less engine deposits, a smoother idle, quicker engine response and greater fuel economy are also claimed. This same "Power Dome" feature is also used on the 76 cubic-inch Merc 850, an improved and more powerful version of last year's Merc 800. At 85 HP, this represents a new power classification for Mercury.

The Merc 110, a 9.8 HP motor designed primarily for fishing, is also a new offering. It weighs 55 pounds, or about 30 pounds less than previous motors of this power. It is similar in size and shape to last year's 6 HP Merc 60, though it has an entirely new powerhead.

All two-cylinder Mercury engines have slanted lower units with the drive shaft angled back and propeller shaft parallel to the water's surface. These are the 6, 10 and 25 horsepower motors.

Propeller hub exhaust is a feature of all Mercury motors for 1962. This is said to carry exhaust fumes and sound well aft of the boat, and to eliminate turbulence and drag resistance of an ordinary exhaust snout. All motors have single-lever throttle and shift control, and spline propeller drive with no shear pins. Hydraulic shock absorbers are standard on the 50, 85 and 100 HP engines. Four and six-cylinder models have an adjustable trim-tab water pickup which is designed to compensate for propeller torque.

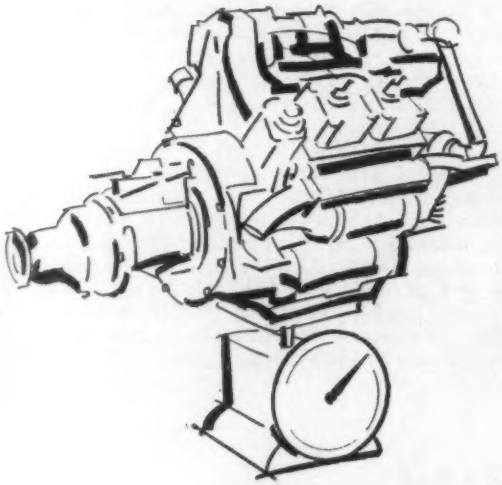
For 1962 Mercury has the Merc 1000; Merc 850; 50 HP Merc 500; 45 HP Merc 450; 25 HP Merc 250, another new Mercury power class; Merc 110 and Merc 60.

McCULLOCH. Scott Division of the McCulloch Corp. has added their own trailer to last year's motor-and-boat package. The boat itself, the Flying Scott 17D75, was designed specifically to take the 75.2 HP Flying Scott engine. Scott tandem trailer, with tilt bed, is matched to the boat.

"Shallowater Drive" is Scott's name for its remote tilt mechanism. This utilizes engine thrust—in reverse—to raise the motor to its tilted position. The operator releases a control which trips a reverse lock. When the motor is shifted into reverse and the throttle is advanced, the lower unit raises into a tilted position and locks in place. The engine can then be operated in forward or reverse. With the motor tilted, a boat can be operated in water as shallow as six inches, according to test reports.

Since their introduction of lean oil-mix operation last year, Scott has continued research into reduction of oil consumption in outboards. Scott motors take a 40-1 mix, if any two-cycle outboard motor oil of SAE 40 grade is used. The need for special white or marine gas is also eliminated, the company claims. All Scott 1962 engines will operate without damage on either leaded or non-leaded fuels, premium or regular grade, from marine or automotive pumps, according to Scott officials.

There are nine models in the 1962 line of Scott motors. They are the electric 75.2 HP Flying Scott in custom and standard versions; the 43.7 HP Royal Scott, also in custom and standard electric versions as well as manual start; the



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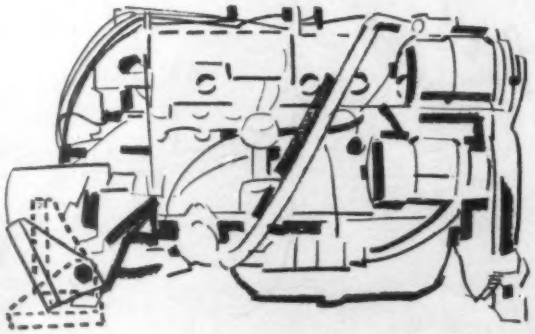

Versatile mount

27.7 HP Sport Scott, electric and manual; the 14.1 HP Fleet Scott; 7.5 HP Fishing Scott; and the 3.6 HP Scotty.

WEST BEND. Biggest news here is a new entry into the inboard-outboard drive field with the Shark-O-Matic 800. This is an 80 HP two-cycle, four-cylinder engine that powers on outboard drive through the boat's transom. This package will be only available to boat manufacturers for installation as original equipment. Production on the Shark-O-Matic 800 is scheduled for early November.

In the regular outboard line, West Bend Tiger Shark 800, a four-cylinder in-line engine that develops 80 horsepower, heads the list. The 40 HP Golden Shark is offered in both electric and manual start models. The Silver Shark models are offered in 25, 18 and 12 HP versions with sound-absorbing fiberglass engine covers. The 7.5 HP model features forward and neutral shift, and full-pivot steering so boat motion can be reversed.

West Bend Little Shrimp has been boosted from 2 to 3.5 horsepower for 1962, by increasing the bore.

The "Electri-Shark" 12-volt electrical system on West Bend's 80 and 40 HP models features a separate coil, condenser and breaker points for each cylinder, eliminating the distributor. This system is said to provide fast starting, smooth idling, and improved low-speed performance. Also included is an alternator-generator with 20 amp capacity on 80 HP models and 25 amp capacity on the 40 HP Golden Shark. Belt drives are eliminated, and the battery is maintained at full charge at all times, according to the company. Automotive type voltage regulators are used to prevent battery over-charging; thermal type circuit breakers protect battery, wiring, generator, ignition in case of overload.

West Bend's remote control synchronizes engine speed with gear selection in a single lever, with a positive idling neutral position. A twin control is also available.

The 40 HP Golden Shark lower unit design can increase boat speed up to 10 per cent, according to West Bend. The design has a dart-like nose and slim fin with 15 per cent less surface area than conventional lower units. It is said to afford the propeller a solid "bite" and minimize drag.

An electric shift mechanism that can be installed on a number of different engines is now being made by Electro-Marine Corp., of Winneconne, Wisconsin. This unit has an adapter bar that fits around the motor's powerhead, and contains solenoids, relay switches, and other shift mechanisms as well as a ski-tow ring. A single level control operates a standard throttle cable and the electric shift. This El Marco shift and throttle control is available for Elgin, Evinrude, Gale, Johnson, Mercury, Scott, and Sea King engines of 40 HP or more made in 1959 or later.

INBOARD ENGINES

New developments in the inboard field do not come as fast as with outboard engines. Many inboard manufacturers make no model changes on a year-to-year basis, but follow a program of product improvement and refinement without regard to time. Others make announcements of new models only during the mid-winter boat-show season. Others, taking their cue from the outboard manufacturers, try to come up with new developments at this time. Here is a report on engines that have been announced.

CHRIS-CRAFT. Two powerful V8 engines, introduced last year are again highlights of the Chris-Craft line. Model 283 develops 185 HP from its 283 cubic-inch displacement. Model 430 is a 275 HP engine with 275 cubic inch displacement. Both develop peak power at 4,000 rpm. A hydraulic clutch is standard for the "430," and an optional extra for the smaller model 283.

All Chris-Craft engines are engineered for use in pleasure or commercial craft. All have full-length water jackets and specially-designed lubrication and ignition systems. Hydraulic clutches are available in most power classes, and all engines operate on standard auto fuels.

CHRYSLER MARINE. A completely new series of engines from 110 to 300 HP and four liquid-cooled diesel engines ranging from 50 to 130 HP will be available from Chrysler in 1962. The new line of Chryslers, called the

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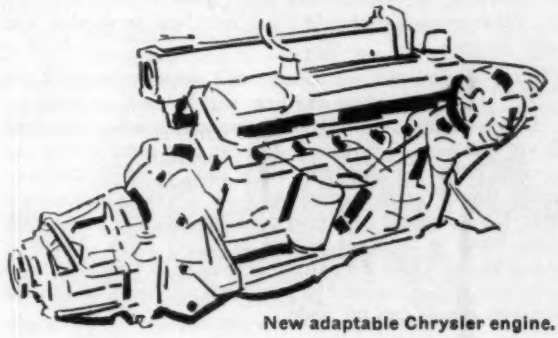
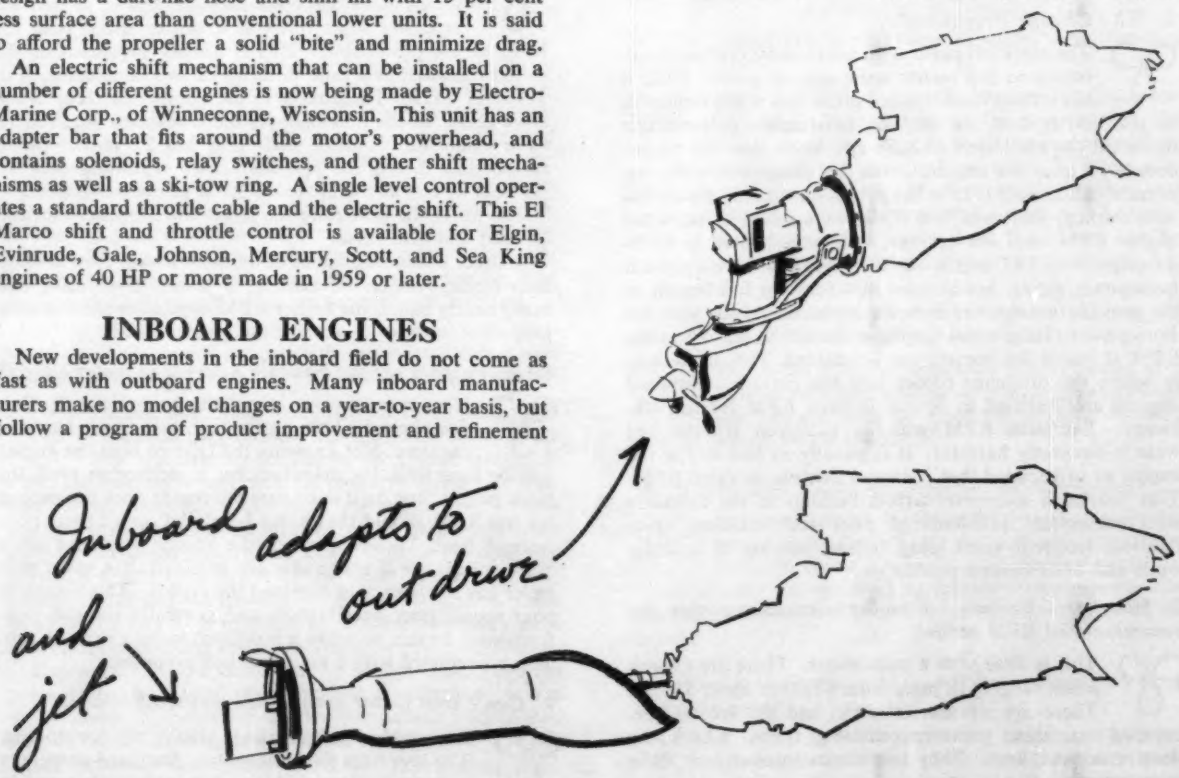


New adaptable Chrysler engine.



PROPELLERS

58 questions most often asked by boatmen

QUESTIONS ABOUT OUTBOARDS

1. What propeller should I use with my particular boat and motor?

Before this can be answered properly, we must first determine how the boat will be used, or what the normal load will be. Information on the boat alone is not sufficient. This particular boat may operate with one specific passenger load most of the time, in which case propeller size selection is relatively easy. On the other hand it may have multiple uses ranging from pleasure riding with light loads to frequent pulling of heavy loads, including water skiers. Once the pattern of loading is established, the selection of the one or two propellers necessary to achieve the best results can be made.

2. Why Change Propellers?

The stock propeller with which most outboards are equipped is a compromise size, of course. Since it has a fixed diameter and pitch, it is really limited in its use and it does not provide satisfactory performance under all the variations of hulls and loads that will be encountered once the engine leaves the showroom. One important fact to note is this: the propeller not only moves the boat through the water but it also determines or regulates engine RPM, and horsepower is directly related to RPM development. The engine cover is marked with a certain horsepower rating, but in most instances the full benefit of the possible horsepower is never realized. Along with the horsepower rating equal emphasis should be placed on the RPM at which the horsepower is attained. This, of course, is where the propeller comes into the picture. Outboard engines are designed to be run at peak RPM for full efficiency. Excessive RPM with its increased friction and wear is obviously harmful. It is equally as bad to run the engine so overloaded that it cannot achieve its rated RPM. This results in excessive carbon buildup in the cylinders with subsequent problems of poor fuel economy, preignition, frequent spark plug failure, scoring of cylinder walls and even burned pistons.

3. How can I be sure my motor is running within the recommended RPM range?

This is done with a tachometer. There are various kinds ranging in price from $5.00 to about $50.00. There are vibrator, electric, and the recently developed crankcase pressure pulsating types. Check the dealers in your area. They sometimes loan or rent these instruments.

4. What are diameter and pitch?

These are the two commonly expressed propeller measurements. For instance, if a propeller is specified as being 10 x 12 size this indicates it is 10″ diameter by 12″ pitch. The dimensions are always given in this order. Diameter is easily determined by doubling the measured distance between a blade tip and the center of the hub. Pitch refers to blade angle and in this example the 12″ pitch indicates that with each prop revolution the boat theoretically would advance 12″ through the water. Due to slip loss the actual advance is somewhat less.

5. Why do outboard motors of basically the same power take entremely different propeller sizes in some cases?

This is due mainly to differences in lower unit gear ratios. All stock outboards are geared so that the propeller shaft turns at a slower speed than the RPM at the powerhead. This is usually expressed in the owner's manual as a ratio in terms of two numbers such as 12:21 or 14:28. These refer to the number of teeth in the drive gears. In the first example the crankshaft gear has 12 teeth while the propeller shaft gear has 21 teeth. Going further this means the propeller shaft is turning only 57 per cent as fast as the indicated RPM at the powerhead.

The lower the gear ratio the larger the propeller that can be used and vice versa.

In other instances engines of different makes may develop their horsepower at different RPM levels. Everything else being nearly equal, the higher RPM engines require smaller propellers in order to achieve the greater RPM.

6. Will a prop change possibly help me in water skiing?

Yes, in most cases. Original equipment propellers are pitched a little on the high side as a safety precaution. Not knowing the type of boat the engine will be used with, the manufacturer is inclined to pitch the stock prop a little high to be sure the engine does not exceed the top RPM should the engine be placed on a lighter than normal boat. However, when the engine is placed on a heavier boat, or if water skis are involved, this same propeller has a tendency to overload the engine. This results in poor speed, poor acceleration and generally sluggish performance. In this situation it is difficult to get a skier on top. This is corrected with a lower pitched propeller.

7. Can I troll better with a different sized wheel?

Low pitched propellers are always best for trolling. The lower the pitch the better. Standard propellers with their relatively high pitch troll too fast and in

throttling down to extreme slow speed they tend to overload the engine. A low pitch wheel relieves overloading, permitting the engine to idle faster while moving boat slowly.

8. Can I try out a propeller for my outboard before buying it?

Generally not, although some dealers do keep a stock of loaner propellers specifically for this purpose. Usually though a dealer has had enough experience with the engines he handles to be in a position to know pretty well what propeller size will work best with a given engine and boat combination.

9. I have a twin engine outboard. Can I get a propeller of opposite hand rotation and run one motor in reverse?

No. This is a frequent question and we would caution anyone against attempting to run any engine in reverse continuously at high speed. The lower units are not made to withstand the reverse thrust and this type of operation can only result in lower unit failures. Some lower units have been available with reversed gearing so counter rotating propellers can be used in a dual installation.

10. What is the correct transom height to run my outboard engine?

On the average family boat it is best to mount the engine on the transom so that the cavitation plate is located approximately 1″ below the bottom of the keel, or 1″ below the bottom of the boat if there is no keel. For boats that are to be used for racing, or actual racing boats, better speeds can be attained by raising the engine on the transom, thus reducing lower unit drag and exhaust back pressure. The best transom height can only be determined by experimenting and it is desirable to get the engine as high as possible, or to the point just before the propeller cavitates excessively.

11. What is the best tilt-setting or shaft angle?

Proper engine tilt is extremely important. It is surprising how many motor owners do not know about the tilt adjustment and its intended purpose. Proper tilt is determined only through experimenting and in any one given boat the tilt setting can change as the load conditions change. The tilt adjustment determines the planing angle of the boat and if improperly set the speed loss can be substantial or the boat may not plane at all. Tilting the engine in towards the transom pulls the bow down and tilting it away from the transom pulls the bow up. By varying the angle you can find the point where the boat assumes the best planing position for the load involved.

12. I get bad torque action with my boat (listing and hard steering). Will a different propeller correct this?

Usually not. Most likely it is the result of any one of several irregularities that may exist either in the hull, the steering hookup or the engine mounting. First, the steering wheel must be properly located in relation to the propeller rotation. If an engine has a right hand rotating propeller the steering wheel should be on the right or starboard side of the boat. This is the side that normally would tend to lift as the result of any propeller torque action and the driver's weight would offset it. This is becoming less of a problem as modern outboards have built-in features in the lower units to compensate for torque.

Engine tilt can be a factor. The tilt should be such that the prop shaft is horizontal when the boat is underway. If it is up or down the propeller can have a definite pull to one side or the other. Check the engine to see that it is in the exact center of the transom and that it is setting level. The steering linkage should be made up of adequate sized pulleys in sufficient quantity, properly swiveled and with the right cable tension. Be sure to check the boat bottom. It may be warped or distorted, and this could very well be the source of the whole difficulty.

13. Will a bronze prop hurt my motor?

It is unfortunate that some believe this to be true. Actually bronze is an ideal propeller material and it has numerous and very definite advantages over aluminum or die-cast materials. Bronze is strong, ductile. repairable, corrosion resistant and in normal service a bronze propeller will last for the life of the motor.

Most frequently you hear that a bronze prop will wear out the shifting mechanism. True, shifting mechanisms do fail and wear out but this is not due to the type of propeller being used at the time, whether it be bronze or aluminum. The most frequent lower unit failure is in the shifter dog and this occurs as the result of improper shifting procedure on the part of the boat operator. Many attempt to ease an outboard into gear with the mistaken idea that this is easier on the shifting mechanism. The opposite is true. The shifter lever should be snapped into gear with some force. In this way only will the shifter dog mesh completely with either the forward or reverse gear.

14. Is it economical to have outboard props repaired?

Generally the cost for a good repair job will run from one third to one half the cost of a new propeller of the same type.

15. Can my original equipment die-cast prop be repaired?

This depends on the type of die-cast and the extent of damage. Some die-cast materials cannot be welded and if these propellers become cracked or chipped, satisfactory or complete repair is not possible. Some die-casts can be welded but if the welding is extensive the total repair cost is uneconomical in comparison to the cost of a new similar replacement. A propeller that is cracked near the hub cannot be repaired at all.

16. The rubber hub in my propeller seems to be slipping. Is this possible?

It is a definite possibility but it does not occur too frequently. Take a look at the propeller. If the blades are visibly bent or distorted you very likely are experiencing cavitation—and cavitation is often mistaken for a slipping bushing. Have it checked by the prop manufacturer or a reliable prop service station. The bushing can be replaced if it needs it or the blades can be restored to proper accuracy to eliminate the cavitation.

17. My outboard seems to vibrate excessively, yet the propeller hardly shows signs of use. Why?

This is not unusual. Propeller blade damage very often is not discernible to the naked eye and blades can become bent or distorted without showing signs of impact or abrasion.

18. Where shall I send my prop for reconditioning?

Extensive service is offered by propeller manufacturers at the factory and through your authorized propeller repair stations located across the country. These stations are operated by factory trained people employing the same methods and equipment in use at the factory.

19. What is the purpose of the rubber cushion hub in an outboard prop?

It is not intended to prevent blade damage as is sometimes assumed. This device protects lower unit parts by cushioning the shock of propeller im-

pact. Its prime purpose, however, is to prevent excessive breakage of shear or drive pins that otherwise would occur due to the jolt or shock that is experienced in the process of shifting gears.

20. Why do I shear so many pins without apparently hitting anything?

The engine may be turning too fast in the shifting range. The shear pin hole or slot may be sloppy or oversized. The shear pin may be of improper strength for the amount of power involved, or the cushion hub may be frozen tight.

21. What about plastic propellers?

Nothing to date has been developed that has all the qualities of propellers made of metals. A good propeller must be durable, repairable and above all it must perform well. So far the available plastics fail in these important requirements.

PERTAINING TO INBOARDS

22. Is an adjustable pitch propeller possible or satisfactory?

An adjustable pitch propeller permits more flexibility of operation than the standard prop supplied with the outboard. However, two or three well-designed rigid props of the pitches needed for different loads will give much better performance than an adjustable pitch propeller.

23. I have a 30′ boat with a 185 h. p. engine. What prop should I use?

No one can ever make a reliable propeller selection from meager information. Much more information on the boat, engine, gears, type of service is required. Past performance information is helpful too unless yours is a stock outfit where performance characteristics are already known.

See your marine dealer or write one of the major propeller manufacturers for a propeller analysis form which their engineers can study and then advise you correctly.

24. Can I buy a propeller that will give top speed and also provide lots of power?

Generally no! To fit a boat for racing speeds or maximum speeds of which your boat is capable involves sizes or pitch ratios often unsuited to load carrying or working conditions. You should decide what is most important to you and have the prop selected accordingly, or change propellers when boating conditions change.

25. For example, you say I need a 13″ diameter by 14″ pitch for my boat. Wouldn't a smaller diameter with more pitch do the same for me?

Pitch cannot be substituted for diameter. Diameter is directly related to horsepower and RPM. These two factors dictate your requirements. If they call for a wheel with a 13″ diameter, a 12″ diameter cannot be substituted without adversely affecting performance by increasing slip or possibly causing cavitation due to too high a pitch ratio for the boat involved.

26. I get a disturbingly large wake. Will a propeller change correct this?

Probably not, unless a change in propellers could cause a non-planing boat to plane. Wake is usually in direct proportion to the hull's displacement. A fast boat in planing position throws far less wake than a slow displacement boat, even though the planing boat goes several times as fast as the slow, wave-throwing hull.

27. I am building a boat. a) Where do I set the engine? b) Where is the proper location for the prop? c) What size rudder shall I use? d) What shaft angle is best? e) What size shaft do I need? f) What shaft materials are best?

a) Engine location is closely tied up with trim calculation which makes it almost impossible to answer this question without the complete scientific characteristics of the boat. The engine's weight and its center of gravity must be calculated in connection with all the other weights and centers. When it is absolutely impossible to obtain any of the characteristics, it may be taken as a very loose rule that the best location for engine weight is 55 percent of the load waterline length of the boat abaft the fore end of that waterline.

b) Aft, just forward of the transom. Sticking the shaft out through the transom or aft of the transom without providing a cavitation supression arrangement will only result in a lot of suds and practically no movement to the boat.

c) For boats between 20 and 30 feet in length, the rudder blade should be about 5 percent of the figure found by multiplying the waterline length of the boat by the extreme draft. Boats between 40 and 50 feet need rudders of about 4 percent, while larger ones need an area of about 3 percent. Blade should extend downward, even with lower prop tip and aft far enough to get area from above formula.

d) Generally as low as possible, as a rule of thumb never more than 15°, allowing for proper clearance between blade tips and boat bottom. A modestly steep shaft angle, strangely enough, does not seem to have a noticeable effect on performance. Normally the difference between say 8° and 14° is negligible.

e) This is related to horsepower and RPM and the type of shaft material you plan to use.

f) Monel, stainless steel and bronze in this order are most satisfactory as shaft material. All are corrosion resistant. Monel is strongest.

28. I run my outfit on mile-high western lakes. Should I adjust my prop size accordingly for best results?

Yes. Gasoline engines all lose power rapidly when operated above 3000′ altitudes. A smaller pitch propeller will not recover the lost power, but will compensate some by bringing the RPM up to correct operating point. Where boats are trailered from high to low altitudes, a prop for each condition is a must.

29. I have a right hand propeller now, but my new motor needs a left hand prop. Can it be changed?

No. Propeller hand cannot be changed without remelting. Remember that turning the propeller around does not change the hand.

30. How much can you change the pitch of a propeller?

Much depends on the individual propeller, its material, size, and style. You can't change an aluminum die cast prop at all, due to the danger of snapping off a blade. The average standard bronze prop can be changed about 2″ either up or down. Where excessive pitch changes are attempted, it must be remembered that the metal near the hubs cannot be changed. Also, stresses and strains can be set up so that a distorted or kinked blade will result, causing poor propeller efficiency.

31. Shall I use a 2, 3, 4, or 5 blade propeller?

In the inboard propeller field two blade propellers are only used on hydroplane racing boats or on sailboats where they are locked behind the deadwood to reduce drag under sail. In all other installations the two blade style tends to be "rough" in operation and not as efficient as multiple blade propellers.

Three blade propellers are "standard." For most runabouts, various speedboats, utilities, cruisers, the right-sized, three blade is always preferred.

Four blade propellers are not too common excepting in

diameters 40" or above, and even here their use is limited. If there is insufficient room to handle the correct sized three blade, a four blade will give enough area to compensate to a degree for diameter reduction.

Five blade propellers are used commonly in cruisers and commercial craft in diameters starting at 18". Elimination of vibration or stern rumble is their main function.

32. What is a true-screw pitch? variable pitch? controllable pitch?

True-screw means the propeller is of constant pitch at any radius. In reality a section of a true helix. Variable pitch comes in many combinations and provides extra speed for fast bottomed boats. The practice of building true pitch is departed from in such prop construction—either throughout the blade or at specific sections. Variable pitches reduce high speed cavitation. Many large boats and ships require variable pitches to compensate for varying wake velocities hitting the blades as put into motion by underbody hull design. Controllable pitch is a mechanical means of pitch setting with the boat in motion. Mechanical problems and costs have thus far made such props impractical except for good-sized commercial ships.

33. Shall I get my propeller dynamically balanced?

No measurable improvements are noted with dynamically balanced propellers as compared to perfect static balanced propellers. However, the discriminating boatowner can have his wheel balanced dynamically at extra cost.

34. What is electrolysis? What causes it? Correction?

Electrolysis is the flow of electricity caused by the difference in potential of two dissimilar metals immersed in electrolyte. The current flow acts as a plating process and one metal is eaten up and deposited on the other. To prevent harmful effects to underwater boat parts, it is usual to attach sacrificial anodes (usually zinc) that are replaced from time to time as they deteriorate thus preventing damage to important parts.

35. Do I use the same size wheel if I convert to a cupped-edge propeller?

No. The diameter should remain the same, but due to the additional load placed on the engine by the "cupped edge" pitch will have to be reduced 1", as a rule of thumb and 2" in propellers above 14" diameter.

36. What benefits if any would I derive from cupped-edge wheel?

Cupped-edged props for fast boats and high RPM reduce slip and give more boat speed as much as 3 MPH on the average, and by elimination of cavitation, are smoother.

37. How close to the bottom of the boat can the blade tips run without losing efficiency? What happens if I run them closer?

From 10" to 18" diameters, 10% of the diameter for clearance is usually sufficient. Above this size better figure 15% of the prop diameter for minimum clearance. Running too close to the hull will cause a cavitation rumble. Risk of damaging boat's bottom is also greater.

38. The man who sold my boat said it would go "X" MPH. I seem to be going not over ⅔ as fast as this, can that be right?

Claimed boat speed more often than not is over estimated, particularly by a seller, which often explains the speed differential. Also, were his speed trials as well as yours accurate and were test conditions similar? The question is hard to answer as so many factors enter the picture.

39. Shall I use heat to install or take my prop off the shaft?

No. Heat is never recommended to install the wheel. If you haven't a wheel puller, and hammering (with soft-faced hammer, of course) doesn't remove the prop, then a gentle warming with a blow torch —never a welding torch—probably will help. Caution: quick, harsh heating can stress bronze metals, with possible propeller hub splitting.

40. Can I put an inboard engine in my outboard hull?

The big question here is whether you will throw the hull out of trim with a heavy inboard mounted midships when the hull was designed to carry an outboard in back of the transom. Normally such conversions are never successful unless the hull was designed to carry the engine weight aft, or you have a V drive or a transom drive with the engine well aft.

41. My outfit does not have the speed I think it should, yet I have tried several types of propellers, why?

It is important to remember that any boat will go just so fast and efforts to drive a particular design beyond that speed are futile. In other words, a hull will reach a so-called "critical" speed. After you have reached this speed, even doubling the power or changing the prop, can't make more than a 2% increase in boat speed.

42. Will a reduction gear give me more power?

Reduction gears in themselves do not provide power. In fact, they absorb power. The reduction gears do, however, provide the means of using a propeller diameter of greater size which may be beneficial for your hull. Reduction gears are commonly used with high RPM engines in large or relatively large hulls, requiring greater blade area than can be used when driving direct.

43. To change from a standard 3 blade, what diameter or pitch modifications must be made for a 5 blade propeller? A 4 blade wide style? A 4 blade narrow style?

For the 5 blade reduce pitch 1" or 5%, whichever is greater where the same engine RPM at full throttle is desired.

Regarding the 4 blade in the 40" to 60" diameter range, you have to come down in diameter 4" to 6" to prevent overloading. This is normally not advisable unless you have a prop clearance problem.

For the 4 blade narrow wheel, change size for size in diameter and pitch.

44. If my motor is rated say at 3800 RPM, should I use a wheel small enough to turn this RPM at full throttle, even though I want to cruise perhaps at 2800 with my cruiser?

From a propeller standpoint this is about as inefficient an arrangement as possible. Remember, a propeller is most efficient at the maximum RPM your engine will turn it; the further back from maximum that your RPM is set by throttle, the greater the loss in efficiency. In fairness to your engine, however, it is well to run somewhat less, say 200 RPM, than maximum. In this particular instance, your propeller should be of a size that will at full throttle turn 3000 and will, of course, be the best propeller size for cruising at 2800 RPM.

(continued on next page)

PROPELLERS *(continued)*

45. What is propeller "slip"?

Slip refers to apparent slip and is a non-dimensional figure expressed in percentage. It is the difference between theoretical MPH and actual MPH divided by theoretical MPH. Theoretical MPH is calculated by multiplying propeller pitch and propeller RPM and dividing by 1056. As an example, we have a boat that goes 20 MPH measured speed. It is driven by a 12" pitch propeller turning 2600 RPM. Theoretical MPH is 12 x 2600 divided by 1056 equals 29.6 total MPH. Subtracting 20 from 29.6 equals 9.6 which divided by 29.6 equals 32.5%.

46. What is normal slip percentage for various types of hull styles?

With wheels properly fitted to a good runabout or utility, 20% would be normal. A planing cruiser about 30%. Displacement cruiser 40%, Houseboat 50% or more. Towboat under tow 50%, hydroplanes 10%. Note: Slip percentages can usually be reduced by changing prop size. This may not be beneficial from an actual performance standpoint, so slip percentages do not really mean too much.

47. Why do hulls of basically the same length, beam, weight and power vary so tremendously in performance?

Here the effect of a real design shows up. The difference between a N.A. designed boat and a "built" boat can be many miles per hour. Men work as hard and study as long to understand and be able to design boats as in any other engineering field, and so often handymen and barn builders turn out nice looking, even gleaming boats that have no performance potential.

48. Why don't I get more than "X" miles per gallon of gasoline?

We never think of miles per gallon in boating. We think of fuel consumption in terms of gallons per hour. Thus, your fuel consumption is directly related to the overall efficiency of your installation. It is well to remember that automotive type engines, and this includes marine engines, all use almost exactly one gallon of gas per hour for every 10 h.p. being developed. This means, for example, that if you burn 15 g.p.h. your engine is putting out 150 h.p.

49. Will these new so-called "Jet" boats eventually obsolete' the propeller driven boats?

Jet boats have been coming and going for a hundred years or more. This is an interesting development but propeller driven boats will be with us for a long time.

50. A propeller larger than I have room to swing is indicated for my boat, engine and gear. Should I use as large a diameter as I can and then add pitch to hold the motor RPM down to correct point?

The only true answer to this problem is change the gear, increasing the shaft r.p.m., reducing the prop diameter requirement, or changing the shaft angle or prop aperture to accommodate the correct size prop. If it is impossible to do either of these options, it is feasible to use a 4 blade propeller for diameters 20" and up. Under 20", a 3 blade larger in diameter than required can be clipped to the very maximum diameter that can be used.

51. Won't a step-up gear make my boat go faster?

If yours is an extremely fast boat such as a step bottom hydro or a drag boat, depending on the engine you have, a step-up gear may enable you to use a propeller size better suited to your needs. Gears for "class" boats are usually worked out by trial and error, so if you stick to what has been or is being done successfully for similar boats you haven't too much to worry about. Step-up gears are the opposite of reduction gears, but we still figure h.p. and r.p.m. at the propeller. Usually with step-up gears, propeller r.p.m. of 10,000 is not too unusual in racing craft.

52. Are super-cavitating propellers made? What are they?

As of this writing no applications of super-cavitating propellers have been made outside of Navy laboratories. If the theory is correct, practical application must wait development of engines and hulls to put it into use.

53. How can I tell if my motor requires a left or right hand propeller?

If, when standing in back of the boat the prop shaft turns closewise, a right hand prop is needed. Also most marine motors take right hand propellers.

54. What causes squatting?

Many things can cause the condition known as hull squatting. A slipping or cavitating propeller will cause a vacuum and dig a hole for itself and the stern settles down into it. Here correction of propeller size can often times correct this condition. Poor hull design, or a good hull put out of trim by misplaced engine or load is a leading factor. A heavy keel, unfaired strut, scoops, or automatic bailing fixtures—or anything else that might disrupt a smooth, free flow of water to the prop, can cause cavitation and subsequent squatting.

55. With a sailboat under sail, should the prop be rotating or locked?

Exhaustive tests for checking the drag of a propeller (both locked and rotating) demonstrate conclusively that there is less drag when the propeller is allowed to rotate or windmill.

56. With twin screw is opposite rotation required?

Theoretically it is best to have opposite rotating propellers. It does definitely aid in maneuvering, by advancing or retarding one engine or the other as required. As far as steering is concerned we have seen many hundreds of non-opposite rotating motors used with no steering problems apparent due to the use of two props of the same hand.

57. With twin screw, should rotation be inboard or outboard?

On twin screw installations, rotation is normally outboard looking at the top of the propeller from the stern of the boat. In other words, the right hand prop should rotate to starboard, left hand to port.

58. What do the stampings on my propeller mean?

Most propellers are stamped on the forward end as to diameter, pitch and shaft size. Diameter is *always* mentioned first and pitch second. Also, you will probably find the size repeated on the side of the hub along with the manufacturer's name and address, the type prop, hand, and date of manufacture.

This feature was prepared in collaboration with the Research Department of the Michigan Wheel Company, Grand Rapids, Michigan.—Ed.

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POWER SOURCES
for small craft

By John D. & Irene Lenk

IT IS estimated that this year will have seen more marine electronic gear installed on pleasure boats than any previous year. You don't have to be a technician to realize that no matter what type of equipment is selected, it must be provided with a power source. Strangely enough, it is the one factor most overlooked by boat owners.

Before you buy, or even think of buying any new electronic gear, you should take a hard look at your boat's electrical power source. You may have no power whatsoever. In that case you must select a power source that is suitable for your particular needs. Even if you already have some power aboard, it's quite possible that this will not be sufficient to handle your planned load. More annoying, your present power source may be capable of supplying an increased output, but existing ship's wiring will not take the strain.

Please understand, we're not trying to start a do-it-yourself movement in the pleasure boat electronics field. In the final analysis, you must rely on a technically competent dealer to select and install the correct power source for your particular boat. However, you, the boat-owner should have some understanding of what power sources are available, and what to look for in buying them.

HOW POWER IS CALCULATED

Before we describe present-day power sources, we'll tell you how to calculate electrical power for your boat, without acquiring an electronics degree in the process. Here are some of the essentials:

Voltage can be considered as a measure of the force in an electrical circuit, and can be likened to pressure in a water pipe. *Amperage* is a measure of current flow through an electrical circuit, and is similar to rate-of-flow in the water pipe. It takes one *volt* of force to push current through at the rate of one *ampere* (provided there is one *ohm* of resistance, which you should promptly forget about). *Wattage*, or power consumed by electrical equipment, is determined by multiplying *voltage* times *current* (amperage). Thus far we have talked about direct current (DC). In calculating alternating current (AC), we use the same terms except that AC *wattage* is determined by multiplying *voltage* times *current* times *power factor*. This power factor is dependent upon a number of conditions which we will not describe here, and is always a value less than one. To get around this power factor nuisance, some kindly manufacturers list the power consumption of the AC equipment in *volt-amperes* (VA) and ignore the power factor.

Now suppose that you wish to install a 60-watt (input) radiotelephone that is available in 6- and 12-volt DC models, as well as a 115-volt AC model. We said 60 watts *input* because the input and output power of a radiotelephone are never the same. Actually, if the output is 60 per cent of the input, you're doing quite well. However, you must use *input power* to determine how much of a drain will be placed on the power source.

Divide the 60 watts by 6 volts. You will end up with a factor of 10 *(amperes)*. Divide the same 60 watts by 12 volts, and you will have a factor of 5 amperes. Now, ignoring the power factor, divide the 60 watts by 115 volts AC, and you'll find the current is about 0.5 amperes. Now if you are paying any attention at all, you will realize that *less current* is required with a *larger voltage* (the drain on a 12-volt battery is exactly half the drain on a 6-volt system, for the same power).

Now that you have the basics, let's sum up three rules for selecting a power source:

1. Total up the power requirements of all the equipment you intend operating from the source. Then convert the power requirements of individual units to a common denominator: watts, amperes, or volt-amperes. We've included the Power Conversion Chart for this purpose.

2. Check that the power source will produce the necessary power which you have just totaled. Assume that all of the equipment will be operated simultaneously and at the maximum rated input. To be on the safe side, the power source should be capable of producing approximately 25 per cent more than the total.

3. Select a power source that is compatible with all the equipment. This is easier said than done, despite the fact that most manufacturers now produce both AC and DC models of the same equipment. If it's not practical to select a power source compatible with all of the units, or vice versa, you'll have to match individual items of equipment with a converter, inverter, or rectifier.

About 75 per cent of today's pleasure boats use batteries as the sole source of electrical power. And this will probably be the case for some time to come, primarily because of the low initial cost and the simplified maintenance problem. However, as boatowners get into the High-Powered equipment (maximum power radiotelephone, radar, autopilots) they will find that an auxiliary power generator of some sort is required. We are not trying to sell generators or batteries. Instead, we will give you the facts and figures on both, and let you take it from there.

FACTS ON BATTERIES

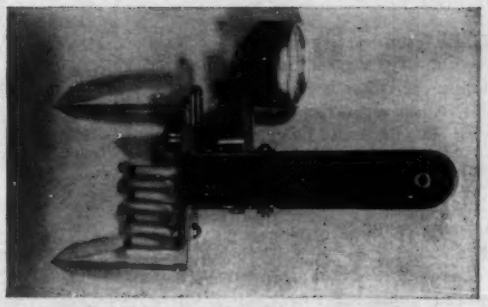
A battery's voltage is determined by the number of cells, each producing approximately 2 volts (a 6-volt battery has 3 cells, a 12-volt battery has 6 cells, and so on). The power capacity of a battery is rated in *ampere hours*. In theory, a 100-ampere hour battery will produce 100 amperes for one hour (at the rated voltage) or will produce one ampere for 100 hours. These figures are definitely theoretical, but they do provide a means of comparing batteries. By totalling the power drain of your electronic equipment, as previously described, you can determine how long the equipment can be operated *between battery charges*. Now we've come to the prime disadvantage of a battery. It must be charged periodically, either at dockside or by the ship's engine. Some marinas now include a battery charger at or near each berth, while others provide a portable battery charger cart that can be wheeled alongside. In many cases, however, the battery must be hauled from the boat to the charger. To get around this, some boatowners have installed battery chargers, or have bought portable chargers.

If you have an inboard, or auxiliary engine, you can use the engine's generator to charge both the engine's battery and an auxiliary battery. Also, most outboards now include a generator (either built-in or as an accessory) which can be used to power equipment directly, or to charge batteries.

When using any form of engine charging, it is conven-

(continued on page 42)

Example of a battery charger is unit made by Multi-Products Co.



Hoyt Cell Tester is a hand-held model that gives a dynamic check on the battery cells.

POWER CALCULATION CHART

IF YOUR POWER IS DIRECT CURRENT (DC) AND YOU HAVE:

Voltage and Current;
you want Wattage.... Multiply Voltage X Current

Voltage and Wattage;
you want Current.... Divide Wattage by Voltage

Current and Wattage;
you want Voltage.... Divide Wattage by Current

IF YOUR POWER IS ALTERNATING CURRENT (AC) AND YOU HAVE:

Voltage and Current;
you want Volt-Amperes: Multiply Voltage X Current

Voltage and Volt-Amperes;
you want Current: Divide Volt-Amperes by Voltage

Current and Volt-Amperes;
you want Voltage: Divide Volt-Amperes by Current

IF POWER IS ALTERNATING CURRENT (AC) THE POWER FACTOR IS KNOWN*, AND YOU HAVE:

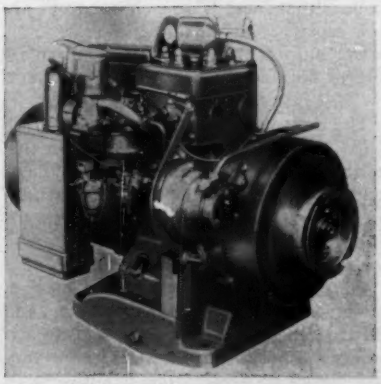
Voltage and Current;
you want Wattage.. Multiply Voltage X Current X Power Factor

Voltage and Wattage;
you want Current... Divide Wattage by Power Factor, divide result by Voltage

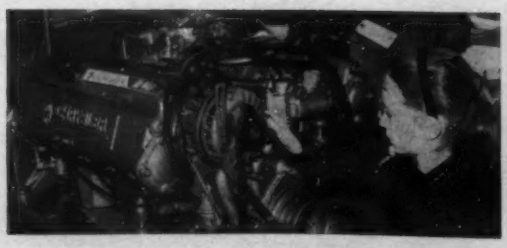
Current and Wattage;
you want Voltage.... Divide Wattage by Power Factor, divide result by Current

*For rough calculations power factor can be ignored

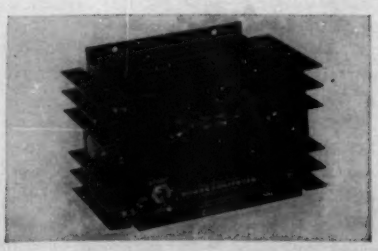
Nic-L-Silver auxiliary battery is provided with convenient carrying handle.



This Onan gasoline-powered, heavy-duty electric plant is rated at a full 2500 watts.



Chrysler marine engine features accessory alternator which is driven by engine's fan belt.



Heathkit power converter changes DC battery power to alternating current.

ient to have a switch-over circuit that permits one battery to be charged while the other is in use supplying the electronic equipment. Such an arrangement will give almost continuous service. But it should be remembered that when the engine dies, power dies with it (except for a final charge on the battery). Considering that engine failure is one of the prime causes for installing a radiotelephone, think how funny you'll feel when you can't call for help because the engine has conked out!

Besides the charging problem, the battery's electrolyte must be replaced at regular intervals. Even in the dry-charge batteries, where the electrolyte is coated on the internal plates, the distilled water level must be maintained. And, no matter what type of battery you buy, it is eventually going to wear out. The internal plates deteriorate naturally due to chemical action.

If you do use batteries extensively, we recommend that you have some means of checking battery charge besides a hydrometer. There are indicators which will provide a dynamic check of battery on a "Good-Fair-Bad" basis. These can be hand-held units, or can be mounted on the control panel and permanently wired into the battery circuit. Most battery chargers incorporate such indicators, but a separate indicator for your boat can be convenient.

USING POWER GENERATORS

Before going on, we may as well straighten out the confusion in names of power equipment. To be technical, a generator produces DC, while an alternator produces AC. If these are driven by a gasoline or diesel motor, which is an integral part of the power plant, they can be termed motor-generator or motor-alternator. If the motor is not an integral part, they are termed generator or alternator. But it's now quite common practice to call all power plants "generators", no matter what driving source is used, or what output is produced.

There are suitable generators ranging from 500 watts (weighing about 100 pounds) and selling for $300 on up to 100,000 watts (weighing over three tons) and selling for $12,500. This means that there is a generator to fit just about every boat and every pocketbook.

In addition to power output, weight and price, there are a number of factors to consider in selecting a generator. These include:

Cooling method. The most popular power plant for small craft is the *air-cooled* unit which has a built-in fan that drives air back over the entire engine, eliminating the need for water intake pumps, lines, and filters. There are air-cooled marine generators which will deliver 5000 watts and more. Next in line are the *marine-cooled* and *direct water-cooled* systems. In direct water cooling, sea water is circulated through the engine under pressure. In marine-cooled systems, sea water is passed through the engine, and back through a heat exchanger. Cooling occurs in the exchanger, but the waters are not mixed physically. For very large craft, there is a choice of *keel-cooling* (captive fresh water cooling system with circulation through a network of piping or condensers located below the water line), or *radiator cooling* which incorporates a deck-mounted radiator similar to that used in an automobile.

Starting method. The simplest, most reliable and most inconvenient starting method involves the use of a crank or lanyard, similar to outboard engines of small horsepower. All of the remaining systems require a starting battery, either external, or as part of the generator. Such power is applied to a starter, which in turn rotates the power plant's engine until the generator takes hold. The starting button and ignition switch can be located on the power plant itself, or at some remote location, usually near the helm on the same panel which mounts the ship's engine controls. For larger craft, there are automatic starting systems which start one generator when another fails, when the load on the first is too great, or some similar condition.

Fuel tanks. Some of the small generators incorporate a built-in fuel tank. This is a convenient arrangement, but limits the generator's running time to the tank's capacity. As alternatives, you can tap into your regular fuel system, or install an auxiliary tank. Either way, it will involve additional fuel lines and fittings.

Accessories. Many power plant accessories fall into the gimmick or gadget class, while others are of real benefit. As an example, some models are provided with a cut-out which shuts down the generator should oil pressure drop to the danger point, or should the operating temperature rise above the dangerous level. Some generating systems are provided with indicators (at the ship's control panel) to register oil pressure, operating temperature, and running time (fuel available). And there are noise and vibration reducing shock mounts, as well as exhaust silencers which make the generator easier to live with. One accessory we recommend is an electrical noise suppressor which prevents electrical noise from ignition, or commutator sparking, from passing through the ship's wiring to the electronic equipment. Such noise can be most annoying when picked up by the radiotelephone.

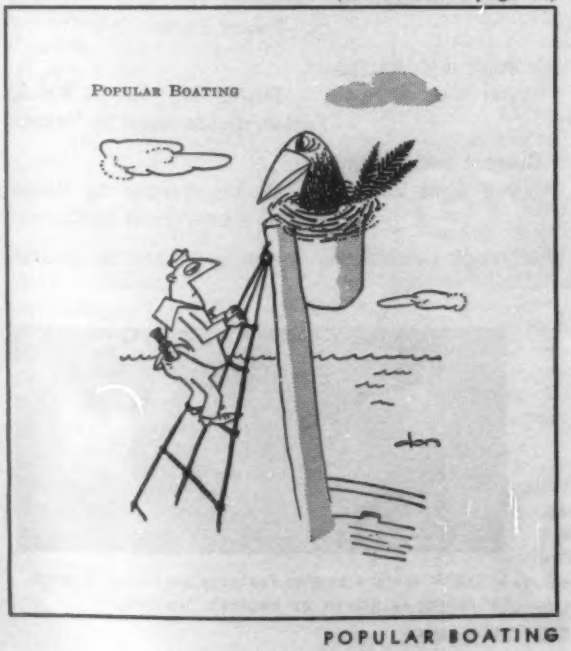
USING POWER CONVERSION EQUIPMENT

Power converters, inverters, and rectifiers are used to match your primary power source to a group of electrical units which do not all require the same input voltage. A good example of this is where you have a radiotelephone which requires a 12-volt DC input, and you want to use it with a depth sounder requiring 115 volts AC. If your power source is a 12-volt battery, it can be connected directly to the radiotelephone, but must be *converted* (or inverted) into 115 volts AC for the depth sounder. Should you reverse the situation, and use a main power source of 115 volts AC, this must be *rectified* into 12 volts DC for the radiotelephone.

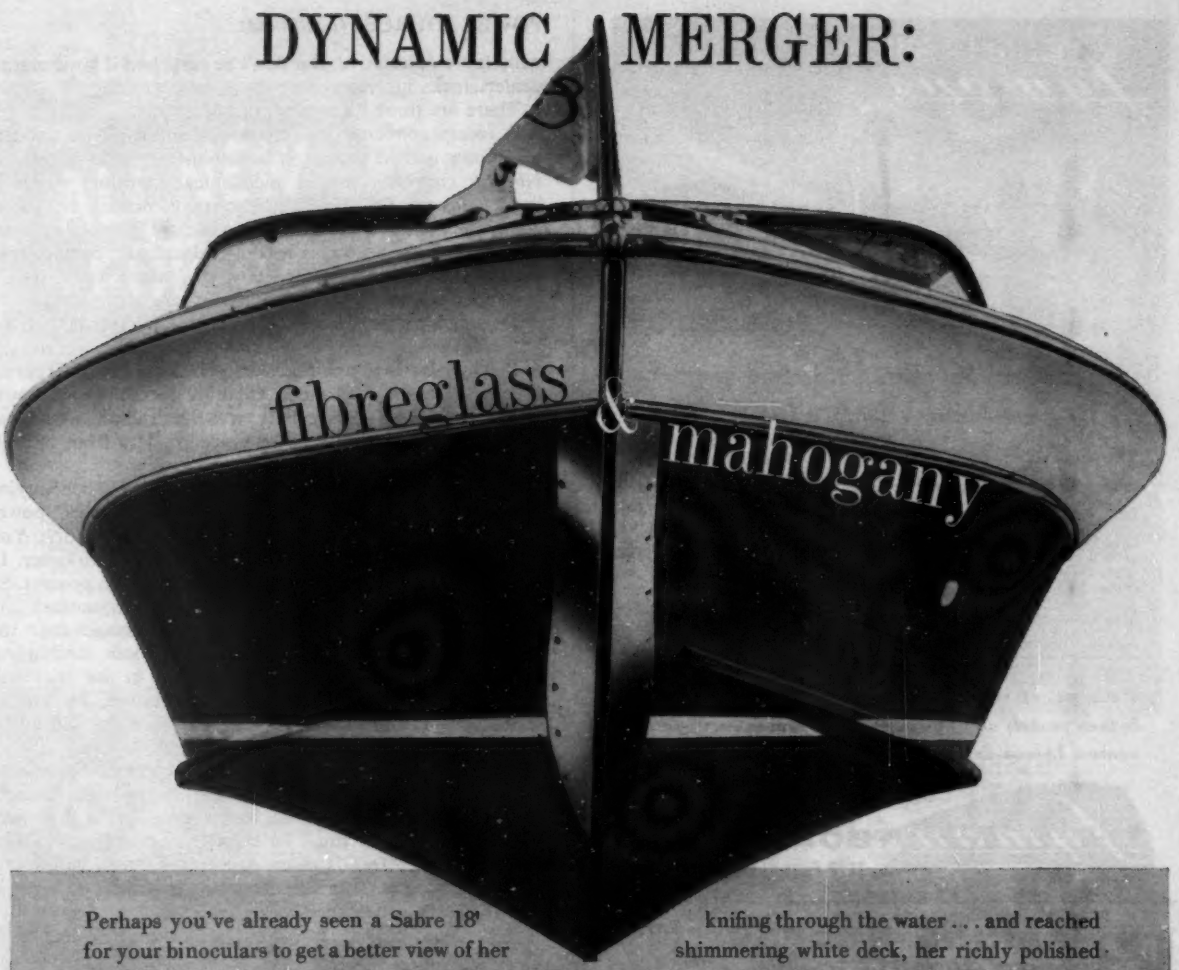
As in the case of motor-driven power sources, there is some confusion concerning the names applied to power conversion equipment. So let's define each and find out how they could fit into your shipboard power program.

Power *converters* change one type of power to another. The most commonly used converter is one which changes DC into AC. A practical application of this is to convert 12-volt battery power into 115-volt AC power so that you can operate TV sets, broadcast radios, or electric razors from shipboard batteries. Power inverters do the same job as converters. We prefer the term *converter* since it is some-

(continued on page 44)



DYNAMIC MERGER:



Perhaps you've already seen a Sabre 18' knifing through the water . . . and reached for your binoculars to get a better view of her shimmering white deck, her richly polished hull. There are two reasons why this radiant new boat captures attention wherever she goes: Fibreglass and Mahogany. Century's naval architects have brought these two materials into vital accord—utilizing each to perfection. The Sabre's hull is sculptured of African mahogany planking for natural buoyancy, strength, and beauty. Her sweep of deck is molded fibreglass—featherweight, leather-textured fibreglass that curves down the sides to be bonded to the all-wood hull. The result is a magnificently streamlined boat that maintains its poised balance—even at 48 mph. Century has equipped the Sabre 18' to be even more luxurious to ride in; there's stretch-out comfort in her deep-cushioned interior. An optional accessory is the permanent hard top with removable hatches for fair-weather cruising.

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what more descriptive. But don't be surprised if your marine dealer stocks inverters.

There are three basic types of converters:

A *rotary converter* is a motor-generator, where an electric motor is used instead of a gasoline or diesel engine. A *vibrator converter* uses a mechanical vibrator, which in itself, converts DC into AC. The more modern *solid-state converter* contains no moving parts. The conversion from DC to AC is accomplished by electronic components, usually transistors. Once the power is converted to AC, it is stepped up, or down, to the correct operating voltage.

Rectifiers perform a similar function to converters, *except they always convert AC into DC.* Rectifiers are usually solid-state, but are not necessarily transistorized. Separate rectifiers are not used much anymore for shipboard work. Today, they are usually built into the radiotelephone or other unit so that it can be operated directly from the AC power source.

There are several points to be considered when buying a power conversion unit to solve a mis-matched power supply problem. First, let's clear up one misconception. You *do not gain* any power through the use of a converter. In fact, some power is consumed in the conversion process. So don't try to use a converter as the main power source!

Solid-state converters do have an advantage over the vibrator or rotary types. Since they are both mechanical devices, and are moving constantly while in use, they will wear out. Theoretically, transistors never wear out. In all probability, future converters for pleasure boats will all be solid-state units.

Any type of power conversion equipment has a definite power limit, *above and beyond* that of the main source. Assume that you had a 500 watt source and a 300 watt load. The converter must be capable of handling at least 300 watts. This fact is often overlooked, even by experienced technicians, with the net result that the converter is over-loaded and damaged.

SHIP'S WIRING PROBLEMS

The amount of current which can be carried by wiring is limited by the wire size. The larger the wire, the greater the current capacity. Small size wire will overheat with increased currents, probably causing damage to the wiring, and possibly causing a fire! Even though your present wire handles several items of equipment, and the main source is capable of handling additional items, it does not necessarily follow that the wiring will take the extra load. So don't scream when the dealer breaks out a wire chart and says he'll have to rewire your boat.

And there's a problem of generated or "spark" noises which can be produced by commutator brushes, alternator slip rings, ignition distributor points, or vibrator contacts. Such noises can be transmitted through the ship's wiring, and must be eliminated *at the source* with the proper filters and noise suppressors.

A more difficult problem, *induced electrical noise,* is caused by ship's wiring which is placed within a moving or fluctuating magnetic field. Electrical devices such as ship's engine, motors, generators, and some accessories create magnetic fields in their normal operation. If the ship's wiring is routed through such fields, a voltage—and noise—will be produced. This condition can be minimized by routing wiring away from such magnetic fields, but a more positive means is to shield the wiring. In this way the noise voltage will be induced in the shield, rather than in the wiring.

SOLVING YOUR OWN POWER PROBLEMS

Now that you have an idea of what to expect in the way of small craft power sources, we recommend that you gather up every catalog, sales brochure, and specification sheet you can lay hands on. Study them thoroughly, keeping in mind the points brought out in this article, particularly the how-to-calculate power paragraph. — ⚓

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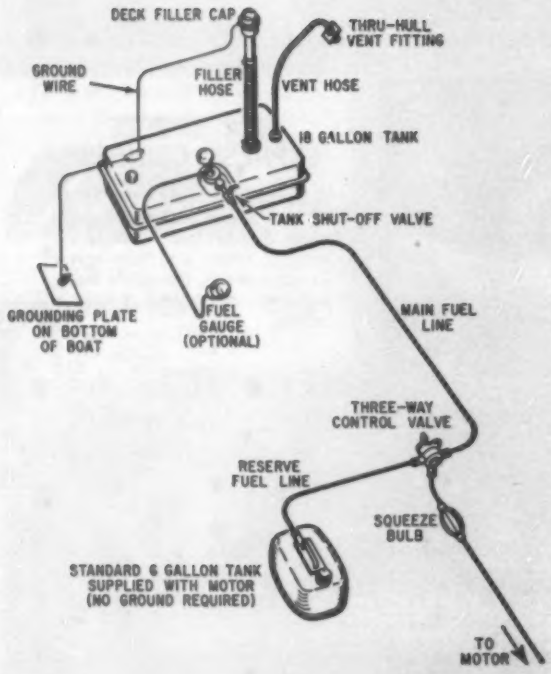
SPECIAL FOR OUTBOARDERS

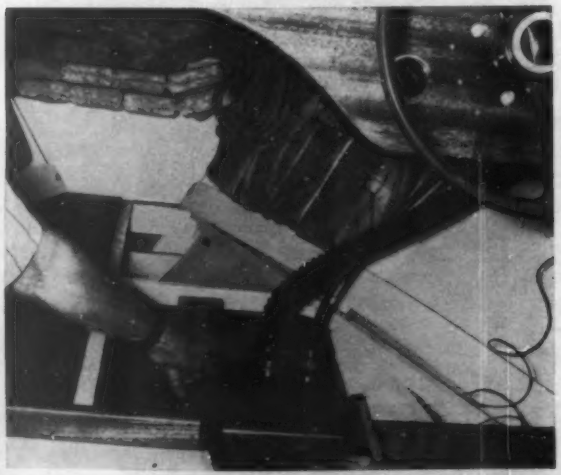
HOW TO INSTALL AN AUXILIARY TANK

By Gordon P. Manning



Suggested setup for a permanently installed gasoline tank is illustrated in the diagram above. The 18-gallon tank is located as far forward as possible, preferably under the foredeck. The trim of your boat is important in locating the tank so be sure to check this before starting the project. A section of flexible hose connects the filler cap to the tank. Coated copper wire can be used as a grounding wire from the cap to the tank. Continue it on to the ground plate. The main fuel line running from the tank shut-off valve to the three-way control valve can be neoprene or synthetic rubber or carefully-installed copper tubing. Run the line behind the coaming or under the floor above the bilge. The line to the reserve fuel tank should be rubber hose with an outboard fuel fitting at the end to take the portable tank. Priming bulb, located aft of valve, starts fuel to engine.

KITS include all the parts necessary for a complete installation. The 18-and 24-gallon fuel tanks for outboards come in several shapes and can be fitted readily to almost any boat.



FILLER HOSE and vent pipe are easily fastened into position. Note the ground wire leading from the filler plate to the tank. From there it goes to ground plate (see diagram).

THE minute his motor stopped, Charlie knew he was going to have trouble filling his gas tank. There was a stiff chop running, and whitecaps were beginning to pile up over the bar. His tank had run dry just five minutes before he would have reached the safe, calm water inside the harbor. Charlie had to transfer gas from the fuel can kept in the cockpit to his fuel tank by the motor.

Rolling motion of his big outboard gave him a hard time. He couldn't keep the nozzle of the can inside the funnel, or the funnel in the tank. He was afraid not to strain the gas. When he started pouring, the gas came with a rush, and a pint or more spilled into the bilge right off. Each time a wave rocked the boat, a bit more gas missed the tank. By the time he had emptied the can, there was probably a quart of the explosive liquid running around loose in the bottom of his boat.

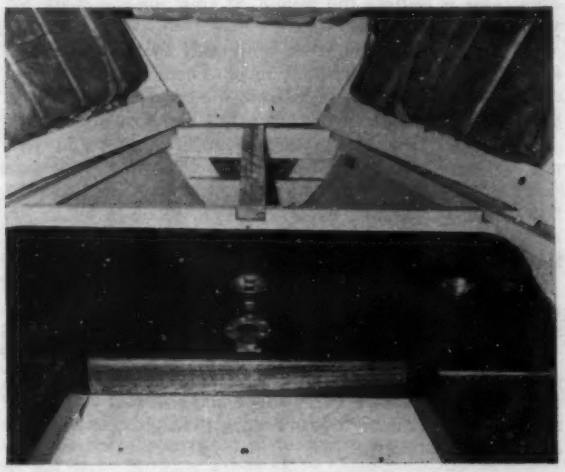
No, Charlie didn't have an explosion when he fired up his engine. Not this time; but it could have happened.

Does this picture seem at all familiar to you? Have you ever been guilty of transferring gas from one can to another while on the water? Have you ever done just as Charlie did, and kept your fingers crossed, hoping that everything would be all right?

I guess it has happened to all of us. For, certainly, one of the most natural ways in the world to carry spare gas is in five gallon gas or oil cans. We step up to bigger motors, year by year, and they call for more storage capacity. So we pick up a couple of extra gas cans, thinking they will get us through. Actually, they do, most of the time. But there are the other times, when gasoline fails to behave the way we want it to, and the result is a fire, an accident, an explosion.

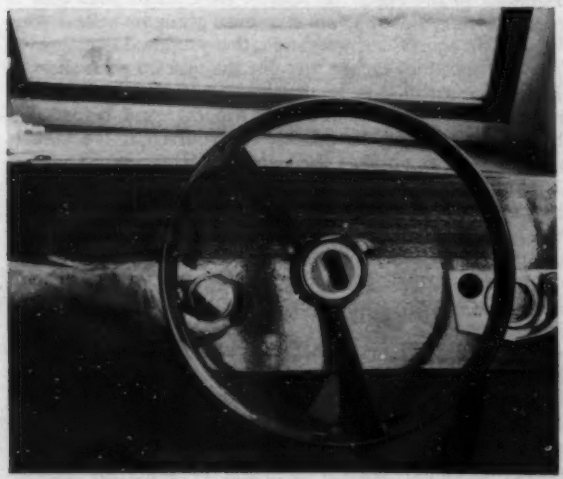
The danger of transferring gasoline from one container to another is great, as the oil companies know so well. They take elaborate precautions in all their handling operations to prevent accidents. They even send their employees to "accident prevention school." Note that marine gas station

(continued on next page)

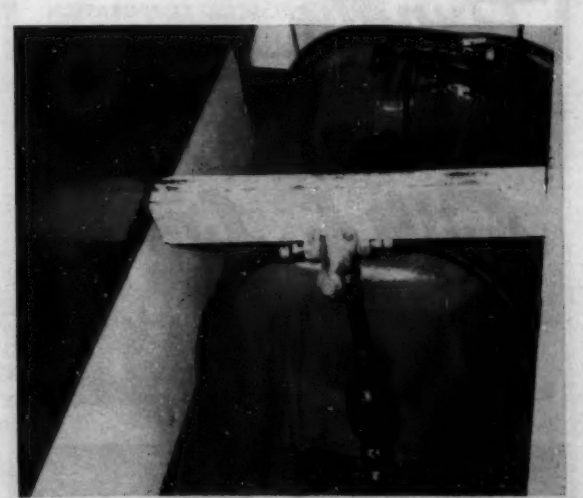


18 GALLON TANK is set into position after the floorboards have been removed. Be careful not to have the tank rest on the hull. Bolt it directly to the frames or longitudinals.

GAS FILLER CAP is located on the forward deck, away from coamings and cabin, and always near the edge of the boat where any accidental spillage will drain overboard.



ELECTRIC GASOLINE GAUGE is conveniently mounted on dash. It is usually needed where the mechanical gauge is concealed by the under-deck or other enclosed locations.



THREE-WAY CONTROL VALVE, attached to crossmember above tank, was used on this installation to permit use of a 6 gallon tank as reserve. Motor is behind bulkhead at left.

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attendants ask you to pass portable cans onto the dock for filling, away from the boat. They know the dangers of spilled fuel in bilges, of sparks from static electricity.

But how many precautions does the average outboarder take to keep down the threat of accidents on his boat?

One excellent precaution is the installation of a permanent large capacity gas tank: one large enough to run your present motor for three or four hours at top speed; one which has a filler cap located on deck, away from the cockpit so spillage will drain overboard; one that is grounded to prevent static electricity from touching off an explosion; one with a vent pipe brought to the outside of the hull where it too can drain overboard; and one that is so firmly anchored that you couldn't pry it loose if you tried.

Your large fuel tank can even be placed where it will improve riding qualities of your boat. Most outboards, it has been found, carry too much of their weight in the after three feet of the hull. This not only puts unnecessary strain on the area, but also makes for poor balance and riding qualities. Now, by locating your gas tank up forward, you can also clear up the cause of these troubles, and also get tanks and cans out of a crowded cockpit area. This is putting the weight of your load to work for you, instead of against you.

I recently examined some outboards that had just finished a 90-mile marathon race. Three transoms had cracked away from the hulls from the severe strains of the race; in each one all the extra gasoline had been stowed aft.

With your tank up forward, your filler pipe and vent can be placed outboard where they belong. And if you don't think this can be a life saver, you have only to read the details of gasoline explosions that occur in boats. In most cases, gas fumes in the bilge is the cause. How did fumes get there? From spillage when filling tanks.

Suppose you have decided that a large gas tank is the right thing for your boat next season. How do you go about installing one?

Fortunately, there are several companies making large capacity tanks for outboards. This is good, because they are available in almost every shape and size that you might need. If one company doesn't make the right size for you, try another company.

TANK LOCATION

In locating your tank, try to keep it out of sight, away from people as much as you can. I would much rather see a tank hidden under a seat, or under the forward deck, than right out in the open. Of course, the trim of your boat is the governing fatcor. You may even want to ballast your boat with equivalent weight in the proposed location to see how she rides before you put the tank in permanently. If you are satisfied as to the location, then take measurements to make certain the tank will fit. And before you have finally settled the matter, ask yourself if the tank is down as low as possible for stability.

Most tank makers offer complete installation kits, and I strongly recommend you use one of these if you are going to do the work yourself. I installed an 18-gallon tank in my own boat, using the kit and instructions provided with the tank. The whole job took something less than a day, and I feel that anyone at all handy with carpenter's tools should have no trouble with this project.

The tank itself must be firmly mounted on its base or risers. Remember, an 18-gallon tank, when filled, weighs more than 150 pounds. It must be fastened so it cannot move in any direction, including up (which it may sometimes want to do). Oak boards and battens are best for this. Bolt them to nearby frames or longitudinals. Never let the tank rest directly on the hull itself.

INSTALLING DECK FILLER CAP

After the tank is set and fastened, locate the position for the deck filler cap. Most kits supply ample flexible fill

hose, so the filler cap can be spotted almost anywhere reasonably close to the tank. Keep the filler cap near the edge of the deck, outside all coamings and cabin sides, so if a careless gas attendant does overfill the tank, the spillage will go harmlessly into the water, not your boat.

The vent fitting for the tank is also located on the outside of the hull, preferably high up near the sheer. Run the rubber vent tube in a curve above the fitting, so water that might splash into the fitting will drain back out, not down into the tank.

With the filler and vent pipes installed, your next step is to insert a shut-off valve at the tank, where the gas line comes out. Now you are ready to cut your gas line to the proper length and run it from tank to motor. Neoprene or synthetic rubber hose is acceptable, and it is advisable not to hide this too well. It may be laid under the floor, above the bilge, or carried along below the sheer, behind the coaming. Keep it easily accessible because you may want to check it or remove it at some future time. Anyway, keep it off the deck or floor where it might get stepped on.

HOW TO GROUND UNIT

Finally, and most important, comes the grounding of your whole installation. When gasoline is hosed into your tank, heavy fumes are generated which could explode if set off by a static electricity spark between hose nozzle and tank. The nozzle must be kept in direct contact with the tank cap when refueling, and the tank installation must be grounded.

A wire is fastened to the under side of the deck filler plate, and led down to the big tank. You can ground it on any of the metal fastenings there. Then lead the wire directly to the hull itself if it is a metal boat, or to an outside ground plate if the hull is wood or fiberglass.

Your ground plate, of copper or bronze, should have an areas of not less than 36 square inches, as specified in the Outboard Boating Club of America engineering standards. The ground plate is fastened to the outside of the hull, below the waterline. Position the plate on the hull, drill a 3/8" hole through it and the hull together. Fit a bronze carriage bolt through the plate, and have the head welded to the plate; or even soldered, to make sure the electrical contact is good. The ground lead from the tank is wrapped around the bolt inside the hull, between a pair of washers, with a nut and lockwasher holding the assembly securely in place.

This installation is in accordance with the latest standards set by the National Fire Protection Association's "Fire Protection Standards for Motor Craft," which is the authority on the subject. If you are interested, you may obtain a copy of their bulletin #302 by sending 50¢ to them at 60 Batterymarch St., Boston 10, Mass.

RESERVE TANK

On my boat I wanted to keep my six gallon portable tank, to get even more cruising capacity. So a two-inlet valve was installed near the small tank, aft. The hose for the large tank leads into one side of the valve; the small tank into the other side. The line to the motor leads from the valve outlet, and the priming bulb is on this line. Now I can run until my big tank is dry, then switch to the six gallon job, which gives me ample reserve fuel to get into a gas dock.

A mechanical fuel gauge is built into most large capacity tanks, but in many cases you may have to locate the tank where the gauge cannot be seen. This was the case in my installation, so I put in an electric gas gauge on the dash panel. It is well worth its small cost, in my opinion.

This, then, completes the work of putting in your new tank. If you decide to do the job, I think you will agree that it is one of the best investments in peace of mind and satisfaction that you ever made. — ⚓

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The Rescue Squad uses four boats and motors in its operation. Besides answering emergency calls, these boats patrol every week end, and during special boating events. They cover over 100 artificial lakes and twenty miles of the Chattahoochee River; they make 50 to 60 emergency runs a year. The squad, which has been in operation 8 years, has received numerous citations for its fine work in answering calls for all types of rescue work—from finding lost little boys to rescuing families stranded by floods.

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Booth (left) with Wimberley Jenkins, Phillips *66* distributor in Columbus. "We appreciate the service we get from the Jenkins Oil Company. It's as dependable as Phillips Outboard Motor Oil," says Mr. Booth.

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How to salvage an outboard motor

ALL kinds of accidents occur, both aboard ship and on the dock, that may cause an outboard engine to go over the side. A quick glance over the gunwale reveals nothing but a chain of air bubbles, and you suddenly think: five hundred bucks, shot! But don't dismay—there is a good chance that your dunked outboard may be fairly easily salvaged—if you act fast and decisively.

How does it happen? Perhaps a safety chain was not attached—or was snapped to the transom handle and not to the motor, in the rush of departure. Rough water, fast turns, striking an underwater obstruction or sand bar that can fling the motor off the transom as easily as though it were clamped onto greased glass. How many times have you observed someone set a small outboard motor on the very brink of the landing dock, then leave it while returning to his car for another armful of equipment. A dock hand is at that moment backing up, helping a large craft come into berth—and he stumbles. Off the dock goes the motor, and possibly the bumbling clod that dislodged it.

We'll leave the wildly thrashing sailor to his own devices at this time. We are concerned with a quick salvage job on that outboard. If the wet stuff is salty, the faster you haul the motor up out of the depths the better off the entire unit will be. There are several possible methods to get the motor topside. The most obvious, of course, is to attach a stout line to a swimmer and send him down to secure an end to the motor. If the depth of water is below 15 or 20 feet, most of us would need the assistance of a skin diver for this emergency. If someone in the crew is familiar with underwater diving equipment, this is a fairly easy method of retrieving the motor. But for the inexperienced diver, or for persons with physical handicaps or heart trouble, far better to lose the motor than risk your health—if no other course of action is open.

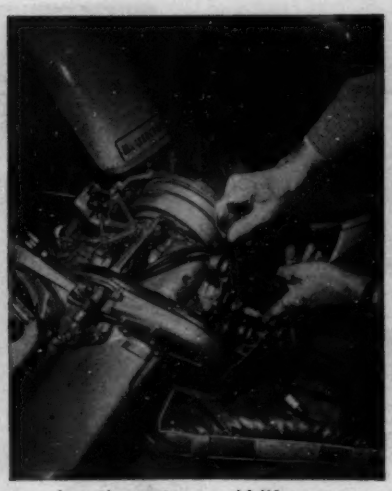
The last resort is the grappling hook on the end of a strong long rope. Be certain to mark the spot with a weighted line tied to a pop bottle, cork, life cushion, or anything that will float. It's easy to lose your bearings on open water. Marking an exact spot on the surface of a lake requires far more than just sighting land marks or the like. Dredging is a tedious chore and will sometimes require many frustrating hours of back-and-forth trips over the submerged object, even when the point of loss is accurately fixed. For this reason, always mark the location before going after ropes, grappling hook, or other help.

If the water is shallow, there is a good chance that you can see the motor below the boat. If so, try to anchor just above and to one side of the submerged motor. Tie a strong line to the transom handle, or other well braced chock, and go down this line to secure it to the motor. If no other lines are handy, use the anchor rope. *Do not* disconnect the anchor—if a sudden wind began blowing while a swimmer was in the water, the boat would rapidly drift away, leaving the diver to a fate no better than that of the motor.

Attach the line to the motor at the front lifting handle, thence back through the rear support handles, if any, tying in at least two places. If you can lift the motor from the water power-head first, so much the better. Don't waste time trying to get the motor into the boat without scratching the metal shroud. Scratches can be easily painted over later. The important thing is to get the motor to shore as quickly as possible and follow these simple steps.

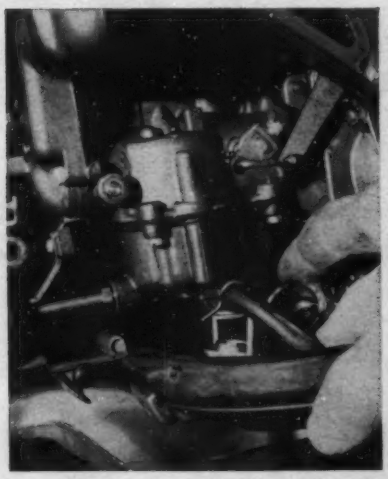
—V. LEE OERTLE

1. After hauling the motor out of the water, try to get it to shore as soon as possible. Wash and wipe off all mud, scum and sand thoroughly.



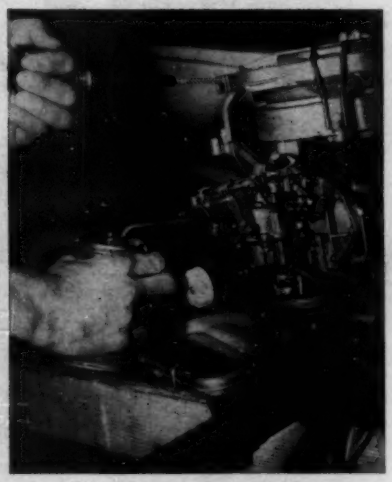
2. Lay the motor on old life preserver cushions, open hood and remove spark plugs. Put the plugs to one side so they will not get stepped on.

3. With plugs removed, lay motor on side with plug holes down, pull starter rope a dozen times. This removes water trapped in powerhead.

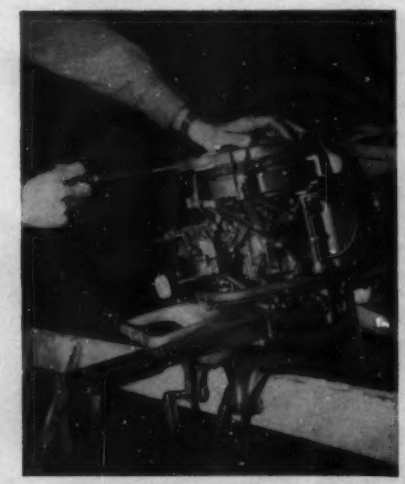


4. Remove the carburetor sediment bowl and clean it in gasoline. When replacing it, make sure that bowl is seated in the correct position.

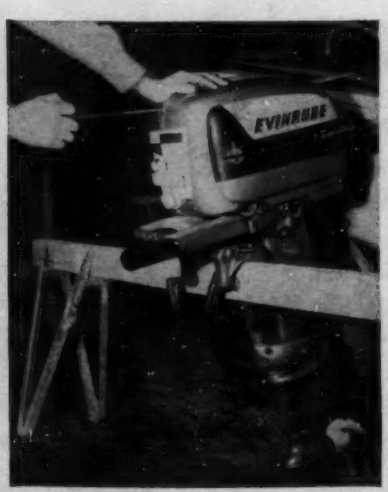
5. Take the motor shroud completely off and set aside. Remove the air silencer from the carburetor in order to gain access to carburetor throat.



6. With an oil can, pump a teacup of gasoline into the carburetor throat and pull starter rope until fuel is flushed through the entire engine.



7. Repeat procedure until one quart of fuel has been flushed through motor. Keep pulling starter rope to force the fuel through the powerhead.



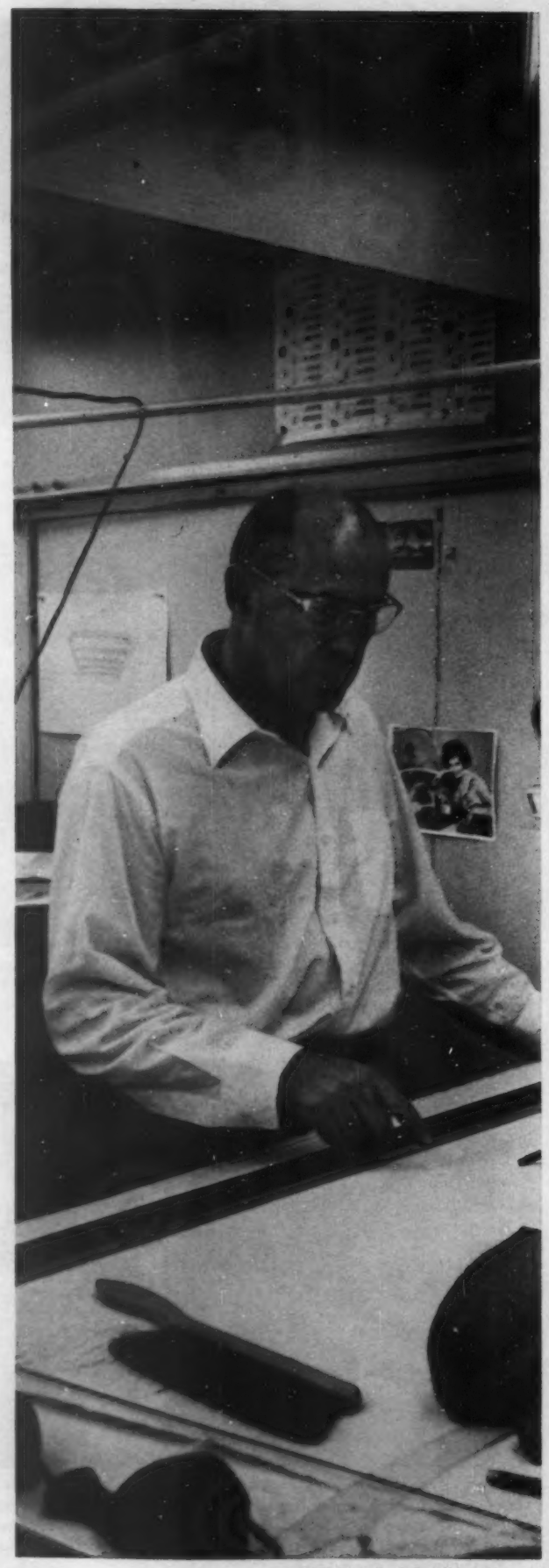
8. Replace air silencer, spark plugs, motor shroud. Dry starting may be attempted, but kill motor immediately if firing begins. Run in test tank.

9. Engine can now be secured to boat. Salvaged engine should be completely disassembled within 3 to 5 hours after being submerged in water.

The Invisible Ingredient In Boatbuilding

BECAUSE a stock boat carries a relatively economical price tag, people frequently lose sight of the ingredients that make it a quality item. The excellence of the boat, its character, performance and durability, is established by the creative thinking and seasoned experience of the people behind the production line—long before the hull is laid down in the factory. True, the manufacturing process must be efficient, skilled and well-controlled; but this is still merely the "process" and the end result is only as good as the thinking and planning that precedes manufacturing.

To give you a broader appreciation of what actually happens when a new boat is "created," we take you behind the scenes at one of the major boat manufacturers. Here at the Owens Yacht Division of the Brunswick Corporation you will see how designers, engineers, top management and manufacturing supervisors—painstakingly and imaginatively—developed their line of "stock" boats for 1962.



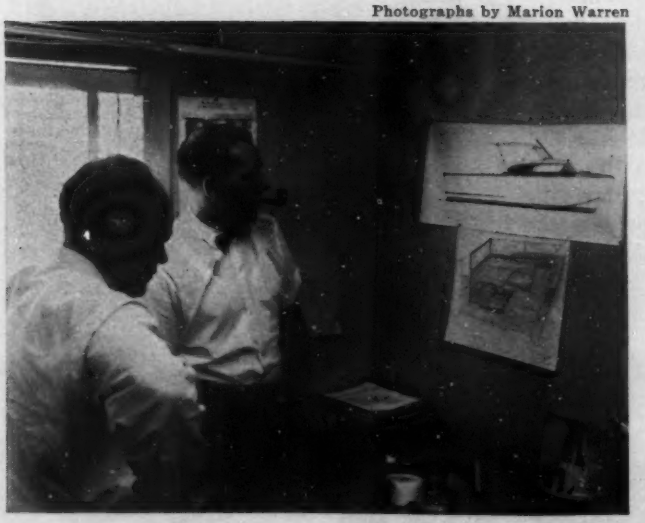
In the engineering department Norman Owens stimulates the creative thinking that produces new shapes, new concepts for 1962.

Creative design

Imagination is tempered with practicality. Here Chris Pater studies buttock lines of proposed Flagship model.

Herman Tegler checks out scale drawing to make sure all the interior components fit within the area.

Photographs by Marion Warren



Designers are constantly refining plans to gain maximum livability below decks. John Long ponders new layout for small cruiser.

continued on the next page

Top management brainstorming session

New designs, prepared by the engineering department, are analyzed by the top brass in the conference room at the Owens factory. Countless hours go into discussions that range from styling to new materials and construction techniques. Each model is studied from stem to stern: how will it perform?, is it livable?, does it meet established standards of quality? Only when all the questions are answered does production get the green light. These decision-makers are (left to right): John B. Owens, President; Herbert Whitaker, Quality Control; Marty Ping, Production; Bill Winkelman, Comptroller; Blake Walker, Marketing; John Purcell, Sales.

Molly Owens selects new fabrics

Dave Myles-Hunkin buys equipment

Paint test is studied by Marty Ping

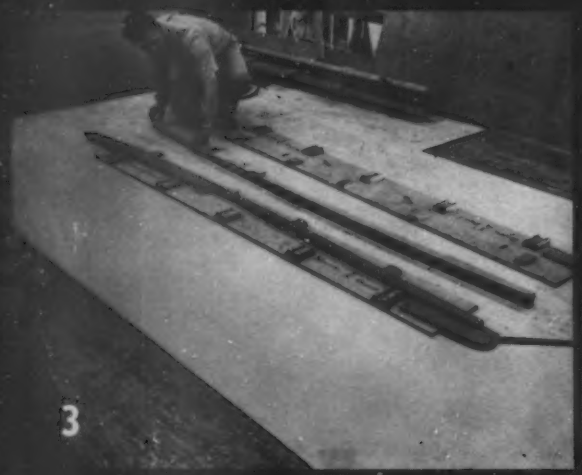
Hardware is ordered by Craig Neus

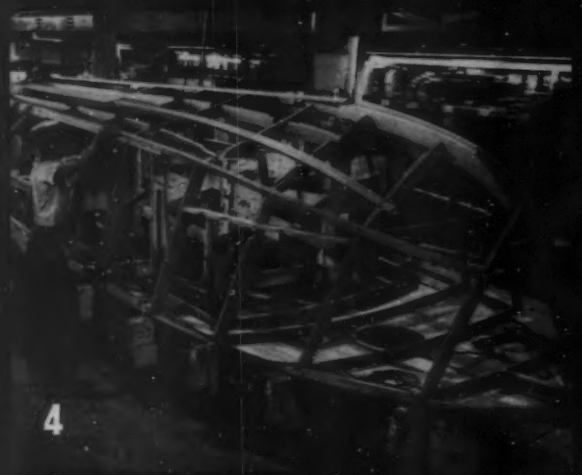
Engineering studies prototype

All the thinking about a new model is finalized in the prototype. Here is where the "bugs" and manufacturing problems are eliminated. John Long and Ernie Ruffell carefully check the framing against the plan.

In the loft a boat and its component parts are laid out to actual dimensions. Master templates are made for every member. Herman Tegler lays out the "plug" from which a fiberglass cabin top will be molded.

Beginning production





Once prototype models have been approved, the lines are reproduced in master templates that are used to make the jigs (1). In the mill, templates are outlined on raw lumber (2) and sawn into component parts. These are spot checked with jig and original template (3). The hull takes shape as the chine is laid on the framing (4).

Advanced planning provides for prefabricated units like this one-piece molded plastic lavatory. Net result: good styling, economy, easy maintenance.

Fiberglass cabintops were carefully designed to complement the lines of the boat. Their honeycomb construction illustrates insistence on quality materials.

Thoughtful engineering

Pre-production planning provides refinements like the accessible gas shut-off.

Good size bilge vent is one of four installed as far-sighted safety factor.

Gas tank (upsidedown) is secured with wide metal bands bolted to the frames.

Special exhaust with water scoop helps to eliminate any excessive steaming.

The Results of Creative Planning

Owens' 1962 fleet has new models from 25 to 40 feet, including utility and sedan styles. This 30′ Flagship is double planked with mahogany and can sleep six.

A good example of the penetrating planning outlined on the preceding pages, this 35′ sea skiff was designed with an eye for stability for off-shore work.

In the luxury class the 40′ Tahitian epitomizes Owens' styling and attention to detail. She sleeps eight and her gay interiors show the deft touch of a decorator.

BOATMAN OF THE MONTH:

The Indomitable Master Of the Niña

"Commodore" DeCoursey Fales

By Guy McCann

MOST men his age devote themselves to the pursuits of gentle retirement, but De Coursey Fales, 73 years old, maintains a blistering pace that would exhaust stout hearts of any age. A tireless hunter, his constant search of challenge acquires richer proportions each year—and usually new trophies.

The Commodore, as he is affectionately known in the yachting fraternity, is sighting a particular quarry this year in the form of a newly-established award for the best ocean racer in the northeast. His unquenchable thirst for competition has driven him well along the way toward this goal.

After shaking down his proud staysail schooner, *Niña,* in the Larchmont Distance Race, he participated in a race that will be long remembered by all contestants as one of the roughest on record—the 1961 Block Island Storm Trysail event.

The Storm Trysail was begun on May 26 under forecasts of severe weather that soon proved correct. While more than half the starters withdrew, the peppy Commodore thrived on the fierce going to bring *Niña* home second in fleet and second in class. His comments on the race dispel any thoughts that ocean racing is always a pleasurable thing. "This race was the deep freeze. Cold, it was bitter cold. Fingers turned white holding the wheel and faces bright red from sting of wind and hail. The radio predicted frost ashore for growing things: for the grownups on *Niña* it was sea-sting. No one wanted to stay on deck." The Commodore's speech is always rich, almost poetic in quality.

The Storm Trysail chill had barely left him when he sailed in the New York Yacht Club Annual Regatta. This time he took fourth in class, finishing the course in four hours, 38 minutes and 43 seconds, corrected time. Out again for the Annapolis-Newport race, Commodore skippered *Niña* home first over the 468-mile course against stiff competition. Although first to finish, *Niña* lost the first place in Class A to *Dyna,* who came out a heartbreaking seven minutes ahead on corrected time, in a race that took 82 hours to complete. Undaunted, the Commodore rebounded in a few days to win the Cleopatra's Barge Cup for the schooner making the best time in the Eastern Yacht Club Regatta which was held at Marblehead, Mass., in the beginning of July.

Commodore is accused of using a special route for the Vineyard Race. Conducted over the Labor Day weekend by the Stamford Yacht Club, the 231-mile round trip from Stamford, Conn., to Buzzard's Bay Lightship off Cuttyhunk, Mass., is one of yachting's most challenging races. All the variables of the Long Island Sound in autumn are present: winds, or lack of them; tides, fog, heavy seas, stormy nights. These are as much an adversary as the competing yachts. However, it seems that the harder the sailing conditions become, the better it is for the Commodore and his famous scrappy yacht.

In 1960 he won this classic for the sixth time, a record no skipper has equalled. When he became a three-time

(continued on page 62)

Rosenfeld Photo

Niña is a picture of power as she drives up wind. She has been winning races since 1928, the year she was built.

winner of the event in 1952, he was entitled to retire the Vineyard trophy permanently. Instead of exercising ownership privilege, De Coursey Fales rededicated the Vineyard Lightship replica as a permanent trophy to be awarded each year to the club in which the winning yacht is registered. In recognition of this manifestation of sportsmanship, the De Coursey Fales trophy was established in 1953 by the Stamford Yacht Club. This is awarded each year to the owner of the yacht with the best elapsed time for the Vineyard race.

HOW HE HANDLES HIS CREW

For a consistent winner, Commodore's relationship with his crew is unique. One would imagine the strictest discipline, with all its ramifications, must be enforced to achieve the machine-like efficiency necessary to bring *Niña* home first. Quite the opposite is true. Aboard *Niña* only one regulation is enforced, even during races: there are no rules unless broken. When major decisions are in order, each member has his say. However, to prevent a democratic meeting of crewmen from turning into a free-for-all that resembles an Arab market, the Commodore exercises an enlightened guidance, which all respect.

"I owe a great debt to my crew," says the Commodore. "They are efficient, happy, and eager to win." Frequent crew members are Peter Comstock, Drake Sparkman, Jr., brothers David and John Sinclair, Hal Wilder, William Close, Arthur Sesselberg, Jr., Daniel Brickford, John Side, Howard Payne, James Danver, and Bradley Daly. A single complaint from the 73-year-old Commodore about his expert seamen: "They grow old or get married."

COMMODORE STARTED SAILING AT SIX

Born at Saranac Lake, N.Y., in 1888, Commodore made his first attempt at sailing in a skiff borrowed from his brother. Just six years old, he set out to teach himself how to sail. It was rough going, but he learned two lessons well. The first was sailing the skiff, which he soon mastered. The second lesson, which has had a lifetime effect and to which the Commodore attributes his present success is that self-taught is best-taught. "I've made every mistake there is to make—and then some," says the Commodore.

Another facet of the Fales' character, perhaps the result of his legal training and perhaps one of the reasons he is still sailing after so many years, is the logic of all his decisions. Pressures of a race never cloud his reason. During the violent 1960 Bermuda race, which went from heavy fog and no winds to a severe storm, the calm, mathematical quality became evident as the storm settled in. "The wind rose quickly to 45 miles and more in gusts. It whistled and blew, and took crests of waves across *Niña* in a very determined and unpleasant way. Drenching rain squalls came and the seas kept building up. One of the men said, 'Are we going to race?', and he said 'Yes, put up the storm trysail.' Under these conditions I think first of safety, and sail reasonably. This time *Niña* acquitted herself like the wonderful boat she is." Commodore, who took first place for Class A in the 1956 Bermuda Race, was third in 1960.

Niña's mettle became evident early in her career when she won the race to Spain in 1928; the year she was launched. Designed by Burgess and built by Ruben Bigelow of Monument Beach. *Niña* was the first ship to make the trans-Atlantic voyage with a hollow mast.

Character of her design is evident from current performance—she is still winning against boats constructed with the advantage of some 30 years of marine design development. When Commodore acquired *Niña* in 1935 from the original owner, Paul Hammond, he made only one major change. He raised the foremast eight feet to make it 50 feet for measurement. Other changes, however, have been numerous and continuous. He has always felt that no raiment is too good for his spirited boat and, except for splash rigging, has completely modernized her. She has four sets of halyards so that sails can be put up as others are coming down. The only special treatment that *Niña* receives is the epoxy finish on her bottom, and the exact method of application is the Commodore's secret.

Within her lockers, *Niña* usually carries 24 sails, including a spare mainsail. Normal sail area is about 2,125 square feet. All sails are stored in a neat, orderly arrangement that eliminates the possibility of inadvertent selection of the wrong sail under pressure of a race, with the further complication of it being discovered only after it is set.

When the anxious Commodore realizes the need for a new sail, he modifies existing sails or designs new ones. One of his best sails, a genoa, is a De Coursey Fales original, nicknamed Miss Valentine by the crew for obvious reasons.

NINA'S FORMULA FOR WINNING

What is Commodore's prescription for winning? There is no set of iron clad rules, only general standards. Preparations are as important as the race itself. Of course, the ship must be kept in good repair. The start of any race is influential, but so is the period before the start. Slap-dash and let go is no good. Get shipshape at least a half hour before weighing anchor. Eliminate unnecessary weight during preparations, so that the yacht will ride like a duck. As far as the race itself is concerned, play it by ear. Consider alternate courses before the race, but maintain flexibility to adapt to situations as they develop. Keep the boat moving at all times. Aboard *Niña* there is a motto: when speed falls, call Fales. *Niña* and Commodore are a formidable combination. The yacht, of course, is a thoroughbred, but it is more the man.

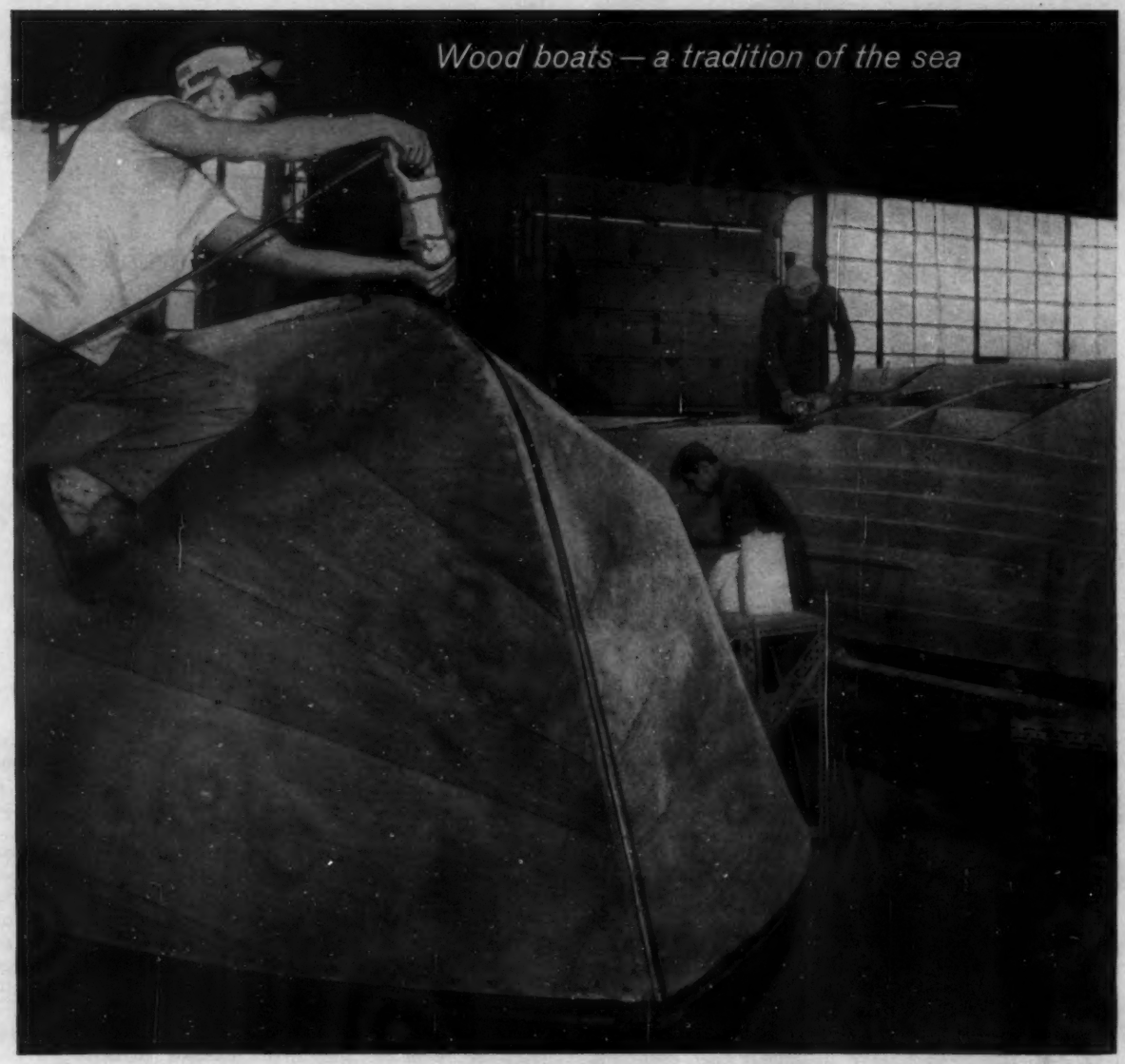
Commodore served in the Navy from 1917 to 1919, during the first World War. He was an aide to Admiral Gleaves on the *USS Seattle*, flagship of a Cruiser and Transport force. Discharged as a Lieutenant, he eventually became an advisor to the US Naval Academy, and in 1947 became Chairman of the Advisory Committee, a position he holds to this day.

De Coursey Fales has been married almost as long as he's been sailing. It was a June wedding to Dorothy Mitchell, in 1917, on the verge of the country's entry into the war. "It only seems like yesterday," says the Commodore, as he fondly recalls the event. "Say something nice about my wife—she's a good sailor and a good sport." Commodore is doubly endowed, with a wife who shares his interest by cruising and racing herself, and at the same time understands the lure of the ocean that takes him away from home for long periods.

STILL GOING STRONG

Commodore lives in a 16-room colonial home on a 425 acre estate in Gladstone, N.J. "Gladstone," Commodore explained, "is about 40 miles due west of my office in New York." While his home offers a great contentment, it also gives rise to his one serious problem: commuting. By losing four hours each day in traveling, he joins millions of fellow sufferers in a common ailment.

His often-frustrated yachting competitors often ask, "How long will he continue to race?" Apparently there is no way to remove him from the sea. "Mainly the thrill of competition compels me to race. I think anyone should do whatever he wants as long as he can, and I feel fine. If I die," he says, "you'll see a coffin on the horizon, two masts and full sails, gliding across the waves. I always have a good time." — ⚓



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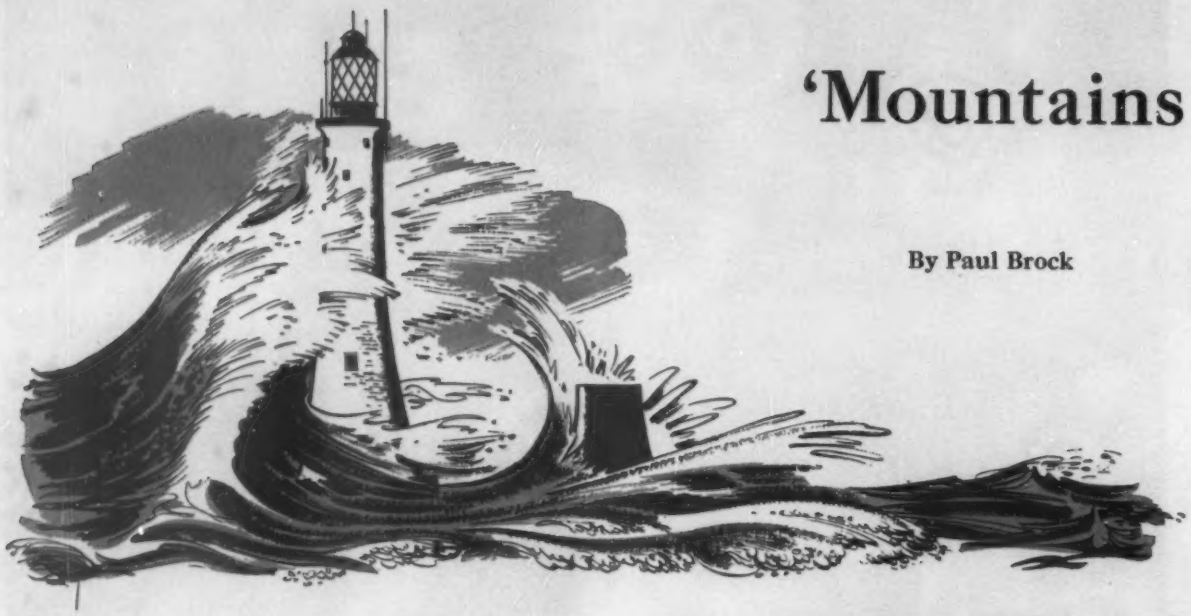
Owens "27" Flagship Deluxe Express Cruiser underway reflects the care and workmanship that went into her construction—of sturdy, seagoing Weldwood Royal Marine Plywood panels.

'Mountains

By Paul Brock



Eddystone lighthouse, in England, was once the 'target' for a huge 40-ton rock hurled at it by a wave. The rock was lifted more than 100 feet above sea level. The structure at right is base of a previous lighthouse.

EVERY winter, almost without exception, one or another of the great ocean liners arrives in port with broken windows, smashed stateroom doors, torn and twisted rails, and even splintered lifeboats, as the result of terrific encounters with the giant waves of winter gales. Even liners, these modern floating monuments to men's ingenuity and labor, are not immune from the forces of nature that took such a heavy toll of mariners of old.

Yet storms that have battered a great 900-foot leviathan may have left a 150-foot trawler without damage. It is not always size that saves a ship from the fury of the elements. In fact it is their very size and weight that render liners liable to damage from the battalions of Father Neptune, when smaller ships come through unscathed. Where the trawler rises above each wave, the mighty liner, disdaining the forces opposed to her, smashes her way through and thus occasionally receives a blow that causes great damage.

Scientists all over the world are studying the phenomena of ocean waves, and are now agreed that even in the heaviest storms, waves seldom reach 50 feet in height.

Height of waves on the open sea can usually be calculated in feet at about half the number of miles per hour that the wind is blowing. Thus a 60-mile breeze will raise a 30-foot wave. There have been instances of waves running to 100 feet in height, but these were probably of a tidal nature caused by some great submarine upheaval or earthquake under the ocean bed.

In the Pacific, where there is a great expanse of open sea and where the water is very deep, great waves up to 70 feet in height often rise during cyclonic gales. Gigantic seas have also been encountered south of Cape Horn and the Cape of Good Hope, where there is an uninterrupted stretch of water for many hundreds of miles. In this notoriously stormy region, great rollers over a thousand feet in length have been noted.

Science explains the action of ocean waves as being caused by the compression of numerous "particles." If you placed a quantity of lead shot in a bottle and pushed your finger down into it, you would cause a depression which is equivalent to the trough of the sea caused by wind pressure.

The displaced shot must go somewhere, and being prevented from going downward by the bottom of the bottle, it naturally rises upwards and forms a hump on the surface, representing the crest of a wave.

Trawler, at right, rides up and down waves like a cork, while liner batters its way through them. Liner's hull strength keeps it from sagging even though the center section may be strained when in trough of waves.

High'

Here's how the wind and water sometimes combine to generate the towering seas that can smash ocean liners or hurl rocks over lighthouses

If the wind is made to take the place of your finger, and water takes the place of the shot, you have the formation of waves. Each "particle" of water moves up and down—not straight up and down, but in a circle. Although a wave may travel for thousands of miles (the sea wave of Krakatoa went half way round the world), the actual water just maintains its up-and-down circular motion. It merely serves as a medium of transmission, just as air carries sound waves without moving. The action of the water gives the illusion of movement. This is shown most clearly by the refusal of a toy boat to come ashore. It merely rides the "incoming" waves, keeping consistently out of reach. Needless to say, tides and currents do actually move the water itself.

Water does not move *forward* in a wave until its movement is interrupted by the hull of a ship, a breakwater, an "iron-bound" coast, or until a shoaling bottom interferes with wave motion. Then the force of the particles is diverted from a circular into a forward motion. That is why the waves dash and spray when they meet resistance. The energy that has been merely revolving is broken up and expends itself shooting water upwards.

"Waves," incidentally, are always called "seas" by sailors. In fact, on board most ships you will not hear the word "wave" mentioned at all, except when officers or stewards are giving information to passengers.

Normally, the more violent the wind, the greater the height and speed of the wave. But in some cases, as in a China-type typhoon, the gusts can be so strong that they blow the sea nearly flat. The speed of waves is usually just a little behind that of the wind driving them, and this, in the northern hemisphere, may be as much as 100 miles per hour. All the disturbance is on the surface of the sea, however. Underneath, the water remains motionless.

Waves reach out very far from their centers of disturbance, and this is why you often see great waves coming ashore on a windless day. Nothing, however, can be told from their height or speed about how far off, or how severe, is the bad weather causing them. But if their crests are near together, it does mean that the water is shallow. Often, also on a completely calm day, groups of large waves will

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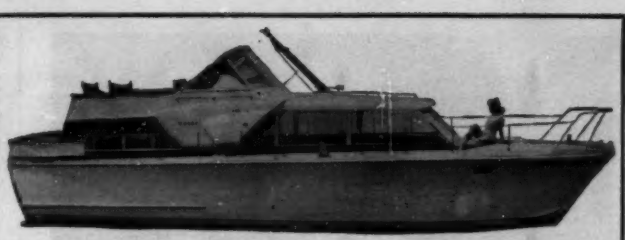

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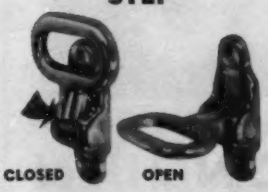

New improved design incorporates a sturdy shoulder or knuckle at the base of the step (see arrow) to prevent bending or giving way under the weight of the heaviest guest. Bronze throughout, chrome plated. Each..... $9.25

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Photograph, Courtesy Owens Yacht Div., Brunswick Corp.

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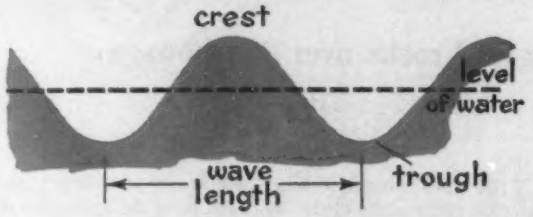
arrive apparently from nowhere, disturbing an otherwise smooth sea. These are caused by a passing squall, well offshore, which has died away and left just those few waves instead of the steady arrival of great rollers, which are the normal signs of lengthier storms.

The height of waves is calculated from trough to crest, and half the wave is always beneath normal water level. Wave length is the distance through the base from the center of one trough to another.

Even in mid-Atlantic, where waves have plenty of room to grow to full strength, they rarely exceed about 45 feet. But in the winter of 1956, the White Star liner *Olympic* encountered a monster estimated at 52 feet from sea level to crest and 52 feet from sea level to trough, a total of 104 feet! Creation of even medium waves requires plenty of searoom, and large ones need anything from 600 to 900 miles. Also, the height of deep-sea waves depends entirely on their length of "base." Sixty-foot waves would run about three to the mile, so that the casual addition of 20 feet to one's favorite "bounding billow" takes in a lot of territory.



Wave height is measured from crest to trough; half the height is above normal sea level; half below. Wave length is measured through crest, from trough to trough.

A wave *crashing* against something solid will rise to almost incredible heights. Lighthouses 120 feet high have frequently had green water go right over them. And altitudes of 150 feet have been reached. But these are splashes, not waves.

A trawler, owing to its lightness and short length, rides the waves like a cork. It rises with the wave and falls with it, slides up onto the crest of a roller and "coasts" down its further slope without plunging headlong into the next one.

The liner is much longer, much heavier, and moves through the sea with a steady, pendulum-like motion, ignoring the state of the surrounding water. The pendulum-like pitch is regular and constant.

In certain circumstances the great hull of an ocean liner may span the valley or trough between the crests of two mighty waves, so that the ship's bow is supported by one wave, and her stern by the other, leaving all her midship section, which contains her machinery and the heaviest weights inadequately supported. If her construction is faulty, her seams begin to open from the keel upwards.

On the other hand, she may poise herself on one mighty crest with troughs ill-supporting her bow and stern, in which may be placed her well-filled cargo holds. Instantly a terrific downward strain is exerted, causing a weak ship to begin to crack from her superstructure down.

These two strains are known as "sagging" and "hogging." They are well provided for in all solidly-built ships, and a great factor of safety above any strain she is ever likely to encounter is provided for by marine architect and builder.

For example, if a ship 900 feet long is caught by two waves, say 450 feet in length, one crest supporting the bow and the other the stern, the "bending strain" is approximately 1,050,000 tons. Yet a marine architect will put the safety factor at nearly double this pressure.

Passengers in ships that have met heavy weather often state (in addition to the inevitable mention of waves "mountains high") that the ship "nearly turned turtle." Few know, however, that the safety factor over and beyond the maximum roll set by architects is really remarkable. The architect of one great American steamship company told me that if the mouths of the funnels and all other vents could be adequately closed, any of his firm's fleet could be put right over until half the diameter of the funnel was submerged,

Water moves up and down with slight circular action that gives appearance of forward movement, but toy boat bobs up and down without coming closer to shore.

and even then the ship, when released, would quickly regain an even keel.

The biggest and most destructive waves are caused by disturbances on the sea bottom. They sometimes reach heights and speeds which are appalling, and the devastation they work ashore is as great as the earthquake which, usually, precedes them. Where they sweep into a bay or estuary, their height increases, though they lose speed. Some of them are 100 feet high, some even greater. The Krakatoa wave, which is thought to have been about 300 feet when it started, with a speed of 700 miles per hour, was fully 200 feet high when it reached the shores of Java. This wave crossed the Pacific, raising the San Francisco tide gauges by seven inches, while part of it rounded the Horn, passed across the Atlantic, and was still two inches high in the English Channel. It took only 32½ hours to make the 11,000 mile journey.

This type of wave is nearly as good a man-killer as an earthquake, and is even more feared by luckless coastal dwellers. Sometimes the death roll is anything from 10,000 to 50,000 persons or more. The Japanese wave of 1703 is known to have killed over 100,000. Under such onslaughts whole towns are swept away, or, on the retreat of the wave, show themselves totally ruined and present the amazing spectacle of a tangled heap of homes and ships, equally wrecked. In 1692, Port Royal in the West Indies was submerged under 30 feet of water, and a British warship had the disconcerting experience of being swept clear over a town of 2,500 houses and back to the open sea in safety.

Height bears little relation to the damage waves can do. Observations made off the coast of Argyll, Scotland, showed that those hammering at the Skerryvore Rocks struck with a force of 600 pounds to the square foot even in summer. During bad weather, 2,000-pounders were quite common,

(continued on next page)

while one measured wave broke with a force of 6,000 pounds per square foot!

Small wonder, then, that an incoming sea at Bilbao harbor in Spain overturned a solid stretch of breakwater weighing 1,700 tons, and at Wick, Scotland, two stone blocks, weight eight and 10 tons, were hurled over the breakwater parapet, which was 21 feet above sea level.

On another occasion, the U. S. Navy craft *Wateree* met one wave that lifted it over a railway embankment into a field at Arica, Peru.

Action of water particles in a wave is demonstrated with beaker containing lead shot. As finger pushes down, displaced shot rises up to form "wave crest."

Even ordinary storm waves are frightening in their violence, and some of their freak actions are almost unbelievable. Lighthouses on very exposed coastlines, for instance, stand an occasional chance of having their lights put out through mountainous seas hurling a colossal boulder at them. A piece of rock estimated to weigh 40 tons was hurled at Eddystone in 1928. The rock was lifted 140 feet above sea level.

A stranger risk that such lighthouses run is of having their doors burst open from within, due to the vacuum created by a huge wave sweeping up the tower.

Sometimes these furious waves seem to be able to bring the sea inland with them, as in the tragic Galveston inundation in 1900 when 5,000 people lost their lives. Such a disaster might be caused by the raising of the water level into a "permanent" wave by steady wind pressure, or barometric pressure. This occurs frequently in inland lakes, where the phenomena is called a "seiche." Pressure in one part of the lake raises water level in the rest of the lake. On the sea coast, this pressure effect, usually accompanying severe storms, means unusually high tides.

But the governing factor in the size of sea waves is always that of sea room. And that is why in the South Seas, where there is little or no land to interfere and winds have nothing to do but blow clean round the end of the world, one could probably find the longest and largest and grandest of wind-caused waves, 45 feet high certainly; possibly even 50. And that is why even a gale never raises anything on a pond in a park higher than about five inches. — ⚓

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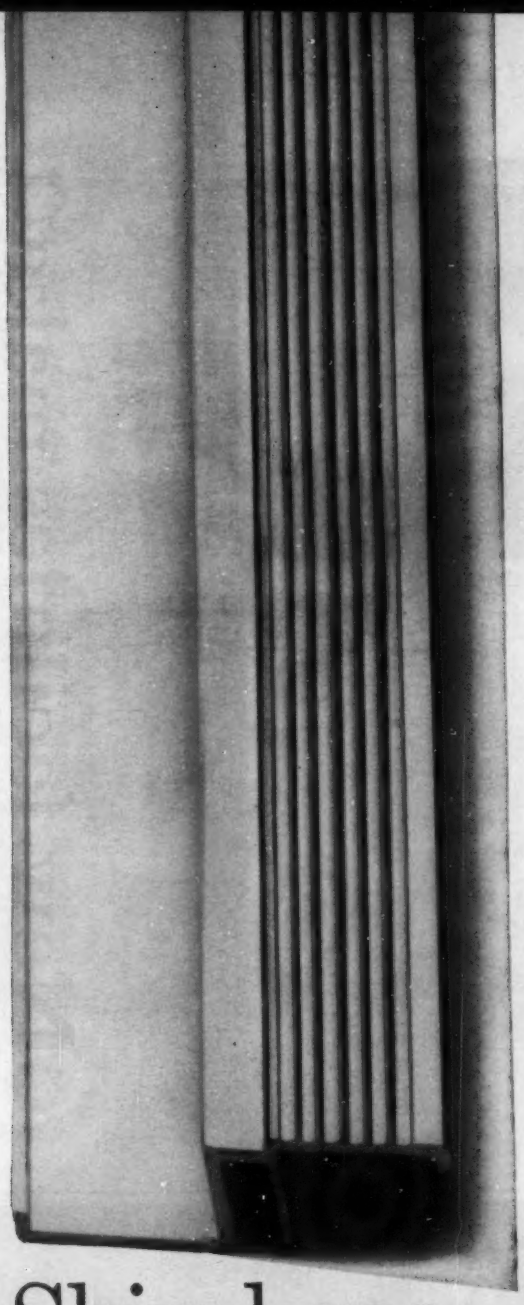

Shipshape

Shipshape means right: like an Olin Aluminum extrusion. The Olin extrusion pictured is one designed from a special 6063 alloy for the Owens Yacht Company. Owens, like many other boat builders, has discovered that Olin's design, technical and marketing staffs (which include marine engineers) – plus its unique field force of extrusion specialists – can come up with aluminum extrusions for trim and structural needs that offer sparkling finishes, accurate

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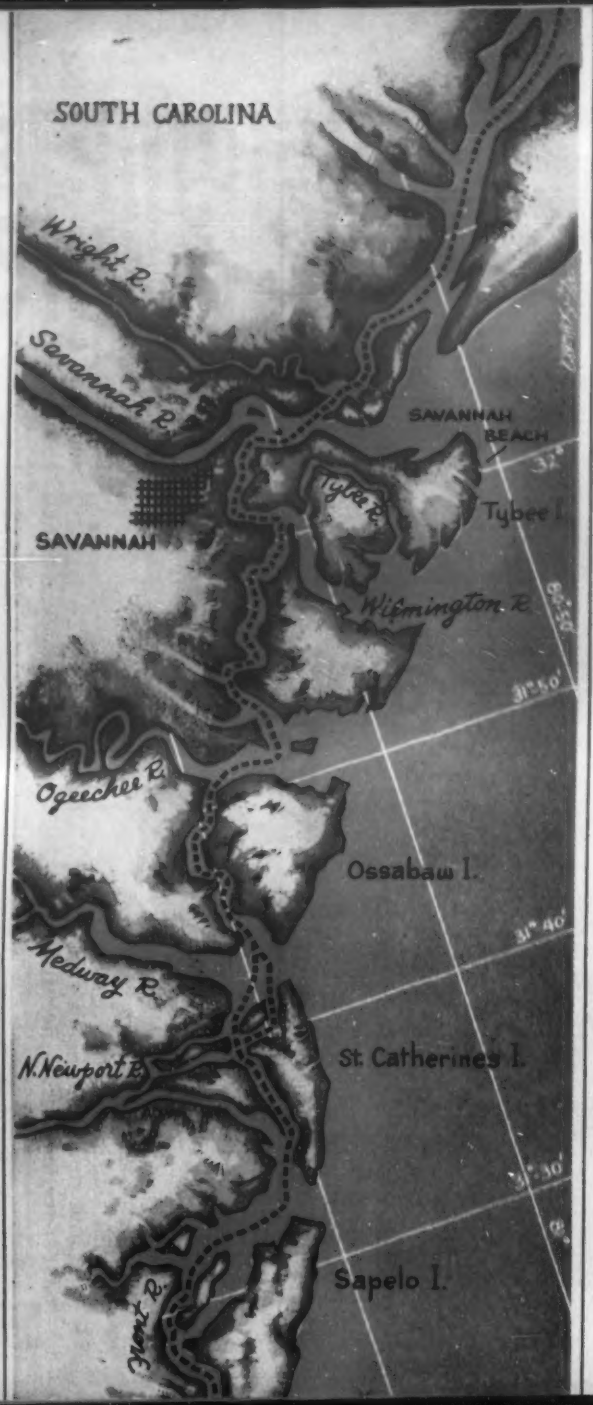
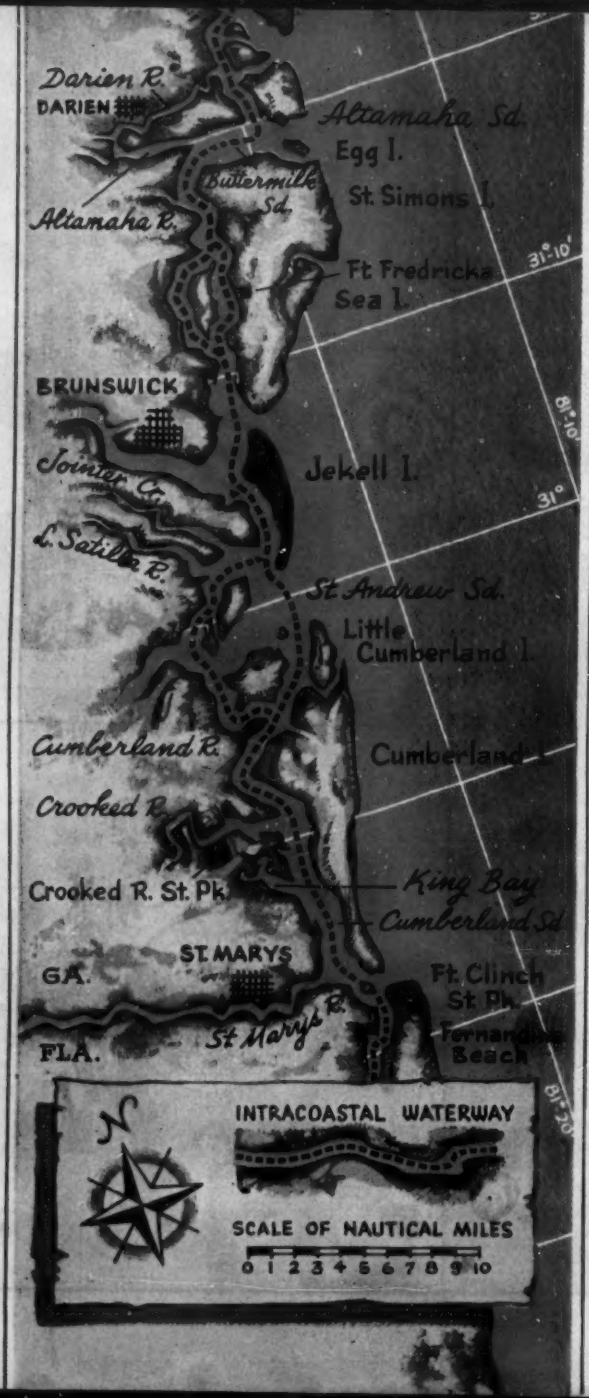


Framed by a wind-bent coastal tree is the historic St. Simons lighthouse, nearly a century old.

New facilities make Georgia's Golden Isles perfect for cruising

By Ken Ferguson



GEORGIA'S Golden Isles are a boat man's smorgasbord," my guide said, "a perfect base of operations from which to explore the 130-mile sweep of Georgia seacoast from Savannah Beach to St. Mary's River." We were standing on the big L-shaped village pier at St. Simon's Island on the lower southeast Georgia coast.

To the north and east was gilt-edged, glittering Sea Island, with its soft green lawns, twisting blue rivers and creeks, fashionable resort hotels and homes. Southward, across the Sound, sprawled world famous Jekyll Island, sheltered by towering pines, palms and magnolia. Directly west, just across the bridge and causeway, was the bustling little city of Brunswick, Georgia, and fifty miles south was Jacksonville, Florida.

I decided to explore this offbeat Shangri-La by boat. I wanted to follow in the historic footsteps of Blackbeard, Oglethorp, Aaron Burr, Audubon, the Wesley Brothers, and the more modern John D. Rockefeller and J. P. Morgan. Waters of Frederica River were calm as Captain Jack McLay and I cast off from St. Simon's Island marina. As we headed north, Captain McLay said, "French explorer, Jean Ribault, touched these shores in 1562. In the course of history five flags have flown over the Golden Isles: French, Spanish, English, American, and that of the Confederacy."

The river twisted and swept out in a wide arc. We passed islands that looked like great green ships at anchor. The river branched and we turned to the east, hugging Frederica River and the St. Simon shore. "Lots of rivers around the Golden Isles," remarked the skipper. "The Altamaha, South Altamaha, Turtle, Brunswick, South Brunswick, East River, Jointer Creek, and Little Satilla, are all winding waterways. Pirates like Blackbeard and Abraham used to run up these waters when Federal gunboats chased them."

Our boat cruised over a shallow oyster bar and knifed between two islands. Tall, golden-brown jungles of marsh grass closed in on us. There wasn't a man or boat for miles. Suddenly, out where the river widened on the St. Simon's shore, I saw the ghostly gray-brown outline of a crumbling old tabby-stone building. Atop the battlement walls was an ancient cannon. "Fort Frederica," stated the Captain, "built by English General Oglethorpe in 1736. He named it after Frederick, Prince of Wales, son of England's George II. Historians tell us that Fort

(continued on next page)

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A picturesque cruise

The famous Christ Church is located on St. Simons Island. Its congregation was established by John and Charles Wesley, who were missionaries to the English troops.

GOLDEN ISLES *(continued)*

Frederica halted Spain's North American advance. It helped determine the fate of a continent."

Continuing on our trip, we pushed out into the blue waters of Buttermilk Sound, and on past Egg Island.

Moments later we were cruising offshore from towering old St. Simons Lighthouse on the island's southerly tip. The light was built in 1871 following Civil War destruction of the one built in 1808. A seafront hotel loomed into view; it was the King and Prince. Soon we came to St. Simons Village, with its new Casino, theater, library, supermarkets, motels, hotels, and pier. On across St. Simons Sound was a magnificent beach-rimmed island. "That's Jekyll Island, purchased as a winter health club in 1886 by Rockefeller, Morgan, Gould, Macy, Vanderbilt, and Jim Hill. J. P. Morgan's 304-foot yacht *Corsair* once anchored here in St. Simons Sound.

We slid into a narrow channel between Jekyll and a smaller island. Towering oak trees shaded the shore. A ribbon of white sand beach traced the shoreline. "Jekyll's a state park now," commented the skipper. "and open to the public. There's a mile-long strip of seaside boardwalk, bath houses, picnic areas, golf courses, and a tent and trailer area. The old millionaire mansions are hotels and apartments. The Rockefeller place is a museum."

Captain McLay slowed the motor as we cruised southward along Jekyll Creek toward the huge new free bridge to the mainland. Off to the left was a crumbling wall of another old tabby-stone ruin. Captain McLay pointed and said, "Major William Horton's place. An 18th century Englishman. Close by you'll see ruins of Georgia's first brewery, where beer for Oglethorpe's troops was brewed. We passed under the new Jekyll Island bridge into the wide blue reaches of Jekyll Sound. A white-hulled yacht went by our starboard side, probably making the southern run along the Intracoastal Waterway.

During the next two weeks I cruised the waters around the Golden Isles, exploring coastal rivers and bays. Here are some suggested stops from Savannah beach to St. Mary's, Georgia on the south:

DARIEN

Don't miss this, if you like a quaint little town sprinkled with historic old forts, ante-bellum houses, 300-year-old live oaks, and friendly, hospitable people who descend from hardy Scotch Highlander pioneers. Cruise northward

in an area where past and present meet

Excellent dockage facilities are available to the traveling boatman at the Jekyll Island Marina. Boats and motors can be rented by the day here and also at the St. Simons Marina.

a few minutes from the Golden Isles to the broad Altamaha River. It is a region of marshes, tiny freshwater creeks and confluence of rivers.

INTRACOASTAL WATERWAY

From Darien proceed northward along the Intracoastal via Little Mud and Front Rivers, skirting picturesque Wolf Island, Sapelo and St. Catherine Islands. Explore the maze of uncrowded coastal rivers and streams.

SAVANNAH

Rich in tradition and a curious blend of the old and the new, Savannah Beach offers visiting boatmen coming up the Intracoastal Waterway a profusion of launching ramps, boat and motor liveries, fishing camps, boat motels, all along with their historic interest. Tybee Island and Savannah Beach front the Atlantic. Savannah City is surrounded by a maze of inter-winding rivers and creeks. Cruise up the Savannah River into the heart of the city or cruise down-river to old Fort Pulaski, which guards the river entrance. The fort was the first to feel the full might of rifled cannon. Closeby are old Fort Screven and Tybee Lighthouse. You'll find a half dozen or more fishing camps and boat liveries on Savannah Beach near the public fishing dock.

SOUTHWARD TO ST. MARY'S

Only a few hours southward via the Intracoastal Waterway and protected smallboat channels is this historic old town near the Florida line. Go down Cumberland River from St. Andrew Sound, skirting Little Cumberland and Cumberland Island. Cruise a few miles up Crooked River, a short distance from St. Mary's, to Crooked River State Park where you will find a modern tent and trailer area for boat-campers. Explore King Bay and the old Spanish Mission ruins near Crooked River State Park. St. Mary's River provides a clear channel into the heart of downtown village of St. Mary's, Georgia. It's history goes back to the 17th century Spanish and French occupation. Here you will find yacht and skiff dockage, marine repair stations, shrimpboat docks, a covered pier at Main Street's end, George Washington Pump, and an ancient cemetery where many French Acadians are buried.

At night you'll see lights of Fernandina Beach, Florida shining across Cumberland Sound. Go into Fernandina, an old pirate haunt, and beach your boat on the sand or use Fort Clinch State Park boat ramp and tent and trailer area. Explore the dungeons of old Fort Clinch and climb atop the battlements and gaze out at the sea. You can make it back to the Golden Isles the same day if you like.

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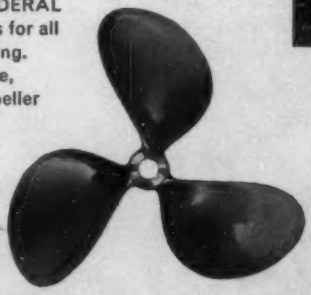

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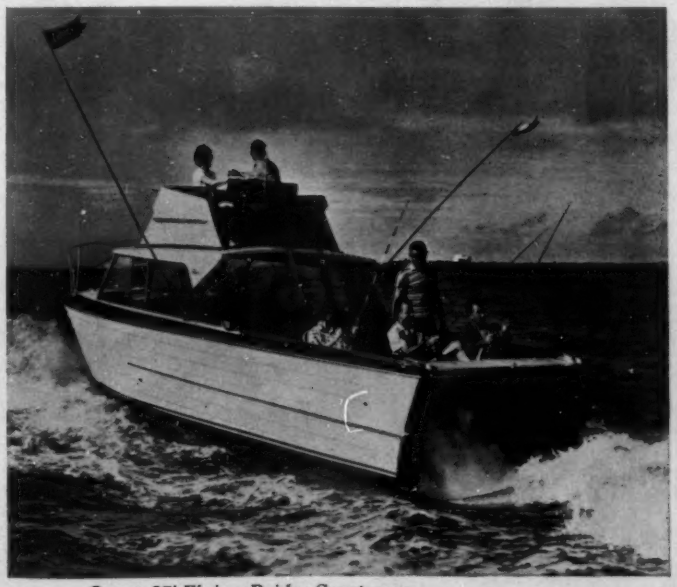

Owens 27' Flying Bridge Sportsman

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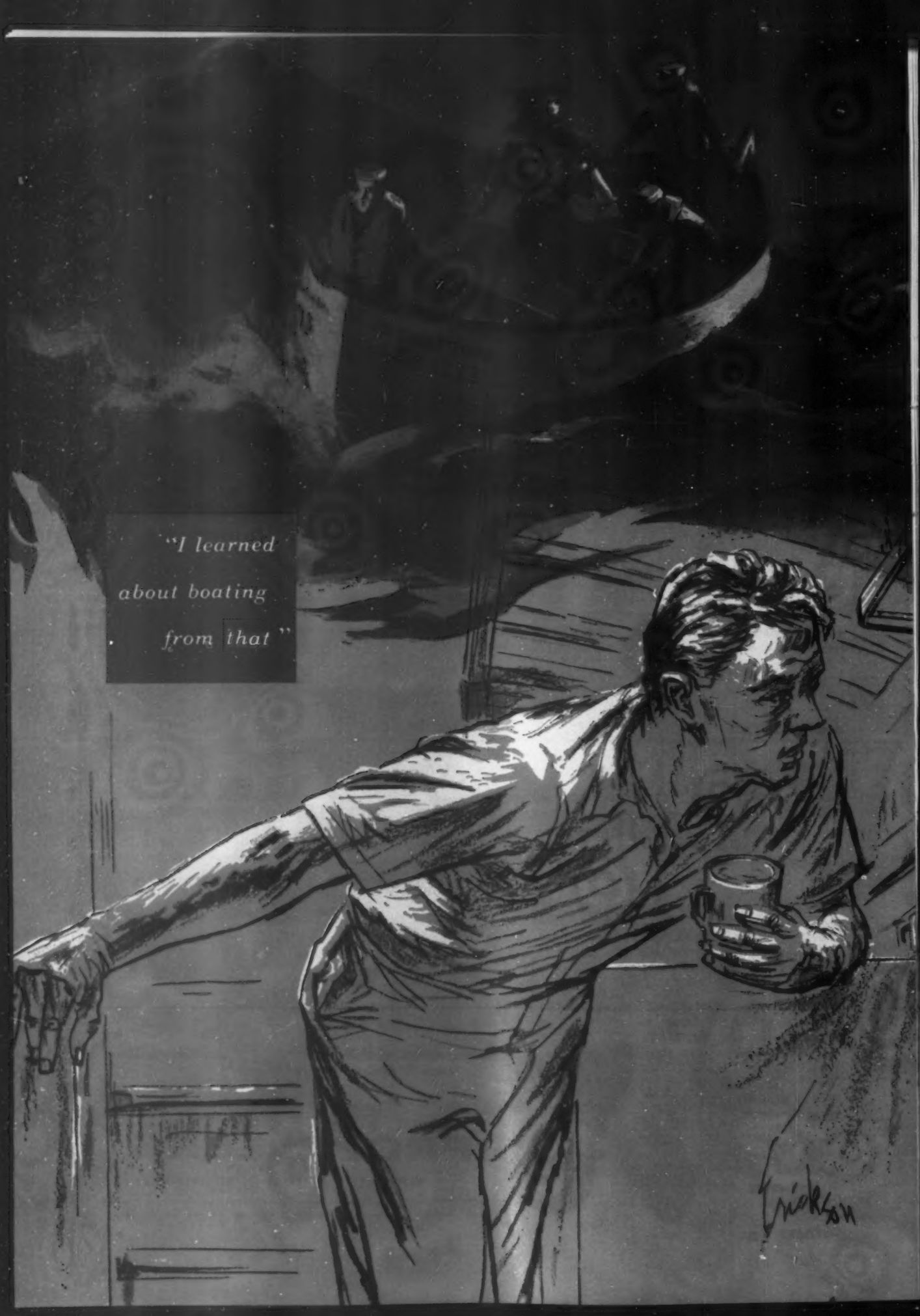
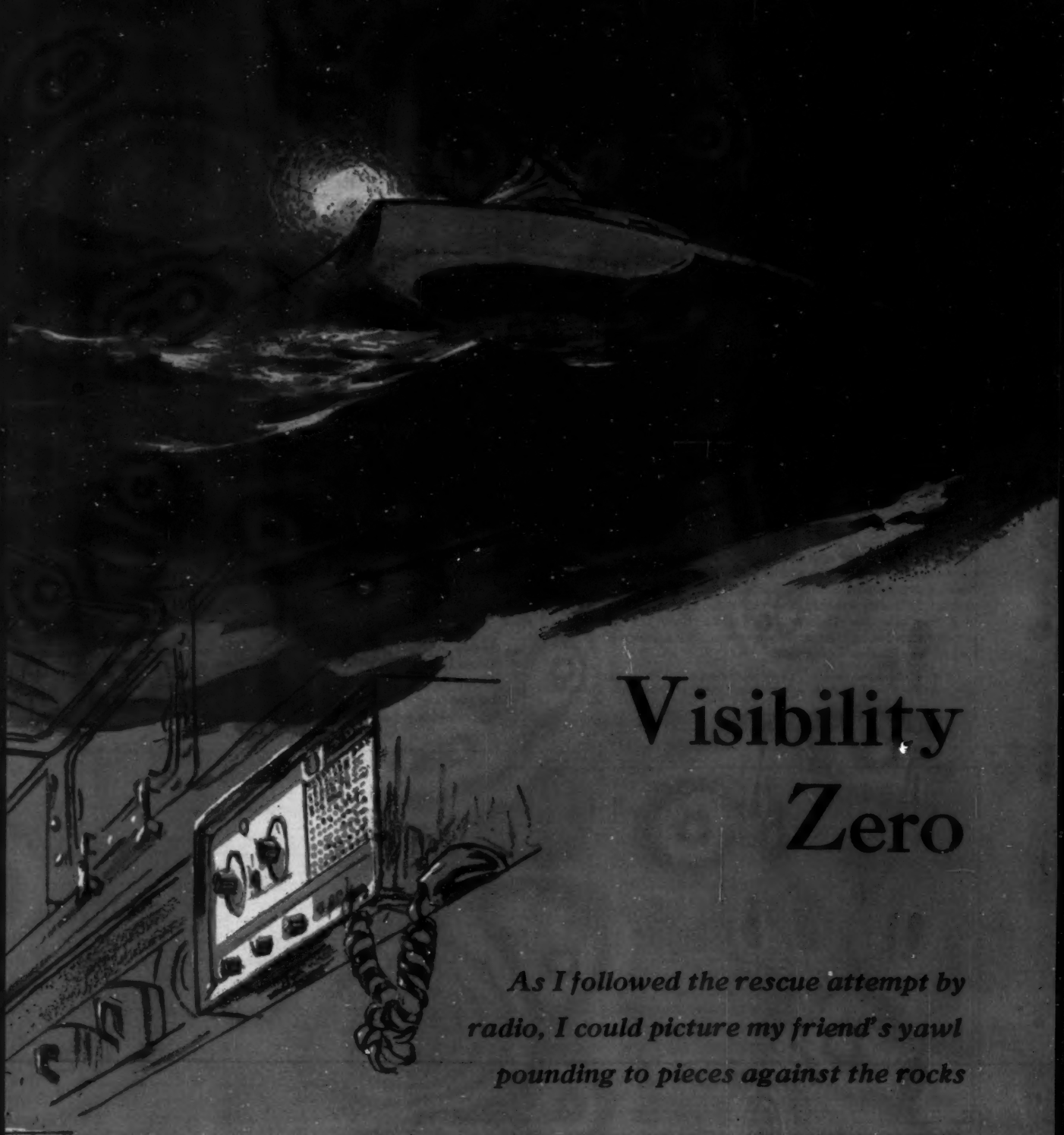

"I learned about boating from that"
Erickson



Visibility Zero

As I followed the rescue attempt by radio, I could picture my friend's yawl pounding to pieces against the rocks

By John Sowden

EVEN a Saturday morning in November can be a pretty frantic at the marine hardware where I worked, when a bunch of yachtsmen are trying to make an afternoon race deadline. No sooner is one man's crisis resolved—whether it's a winch spring, a turnbuckle, or a new jib sheet—then there's another tugging at your arm for service. That's why I noticed two young men standing quietly by the counter talking together. They wore the faded blue work uniform of the Coast Guard, and their hands were paint stained a white that matched their caps. I had ignored them beyond their turn in my haste to get those sailors to the starting line or off for a weekend at Catalina. Finally, when I saw that every remaining customer had a salesman in tow, I turned to the tall boy with the tousled hair and blue eyes.

"Can I help you, Son?" I asked condescendingly. *(continued on next page)*

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VISIBILITY *(continued)*

"Yes," he answered, and turned to his short, red-haired companion.

"Give it to me, Joe," he said, holding out his hand.

Joe fumbled in the pockets of his pants and jacket. "Spider," he said at last, "I ain't got it!"

"It figures," said Spider in disgust. He reached up and jerked the brim of Joe's hat down over his eyes. "We need," he said, turning to me, "some flat head bronze screws about so long." He held up thumb and forefinger.

Something clicked in my memory. "Say," I said, "weren't you fellows in here yesterday with a purchase order to charge four dozen flat head bronze wood screws, four-inch eighteens or thereabouts?"

They were both grinning like two small boys caught with slingshots in hand in front of a broken window.

"We lost them," said Joe.

"Give us another four dozen," said Spider. "And this time it's cash." He winced at the word.

I counted out the screws, figured the cost and accepted their somewhat reluctantly offered money. Joe picked up the sack of screws, stuffed it into his jacket pocket, patted it a couple of times, and grinned up at Spider's skeptical look. They thanked me and walked out into the hazy southern California sunshine.

As I rang up the sale slip, I prayed that I'd never have to depend on those kids to save my boat—the one I spent three long, hard years building. They looked like nice boys; but in an emergency I sure had my doubts.

Saturday afternoon was the usual rat-race, and I forgot Spider and Joe until about three o'clock, when I glanced across the highway toward the sea to see a solid wall of fog rolling in across Newport Bay. It seemed that one minute the sun was warm and inviting, and the next the black asphalt was wet and glistening with cars creeping bumper to bumper through the gloom.

SOUTHERN CRUISING

Join us next month as we head due south for a leisurely cruise through the Caribbean Sea. We'll board an Australian ketch and visit the Windward Islands, with their coral inlets.

By five o'clock, when we closed up, there had been two grille smashups out in front, and though I knew the three mile ride to my slip like I knew my wife's smile, it was a nightmare of anxiety getting there in the car.

As I walked shivering along the slippery dock, checked the mooring lines and climbed on board, the tang of wood smoke from the stack made my mouth water. Below, Johnny, our four year old, was crayoning a color book on the port forward bunk, and Louise was just taking a golden brown apple pie from the oven. The little kerosene lamp cast a soft glow against the overhead beams, and the smell of the pie was delicious. It was good to be home, and I almost forgot the smothering, impenetrable fog outside.

After grilled hamburgers, pie and coffee, Louise tucked Johnny in his bunk. I blew out the lamps and opened the Shipmate's firebox. We stretched out on the bunks with a second cup of coffee.

I reached up behind the bunk and flipped on the short wave receiver, turned the dial to 2182 and leaned back to listen. I knew that channel would be busy tonight. It was. The first voice came through scratchy, but readable.

"Coast Guard Radio Long Beach, Coast Guard Radio Long Beach, this is Coast Guard 452. Do you read me?"

"452, this is Radio Long Beach. Over."

"Coast Guard Radio Long Beach, this is 452. We have the *Feliz* in tow. We are 2½ miles south of Newport Jetty. Proceeding to port at five knots. Over."

"Roger, 452. Notify when mission completed. Out."

Louise looked across at me. "If you hadn't been working, that could have been us," she said.

I nodded, knowing that even with RDF and the best of navigation, how easy it was to miss the harbor entrance,

(continued on page 78)

Rub rail molding (manufactured by Trine Rolled Moulding Corp.), pulpit rails and stanchions are formed of Crucible stainless steel.

above and below

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VISIBILITY *(continued)*

and the sickening dread of being in shoal water when you couldn't see your bow from the cockpit.

The ship's clock on the bulkhead struck six bells—seven o'clock. I turned up the volume on the radio.

"Calling the Coast Guard, calling the Coast Guard, this is the *Rickey II*, the *Rickey II*. Come in please."

"The *Rickey II*, the *Rickey II*, this is Coast Guard Radio Long Beach. What is your approximate location?"

"Coast Guard Radio Long Beach, this is the *Rickey II*. We don't know. We were headed for Newport jetty when she socked in about half way from Catalina Isthmus. We heard breakers about an hour ago and turned out to sea. We must be a mile or two off now. Over."

"*Rickey II*, this is Coast Guard Radio Long Beach. Did you see anything on shore? Did you see anything on the shore? Over."

"Yes, we saw some rocks—like a small jetty and a large white mooring can—about five feet across. Did you get that? Over?"

"Roger, *Rickey II*. Stand by."

In the silence, I switched on the overhead chart light, grabbed 5142 Coast and Geodetic chart, and spread it out on the cabin table.

"Sounds like the Edison plant at Seal Beach," I said.

"I hate the fog!" said Louise.

But I could find nothing for sure on the chart. I turned off the light.

"*Rickey II, Rickey II*, this is Coast Guard Radio Long Beach. Could there have been two buoys? Could there have been two buoys? Over."

"Yes, I guess there could have been two buoys. Visibility was almost zero. Over."

"Roger, *Rickey II*. Please stand by. This is Coast Guard Radio Long Beach calling Coast Guard 350. Coast Guard 350, are you receiving? Over."

"Coast Guard 350 to Coast Guard Radio Long Beach. Go ahead."

"350, this is Radio Long Beach, what is your position? Over."

"Coast Guard Radio Long Beach, this is Coast Guard 350. We are three miles southeast of Alamitos Bay, proceeding at five knots and sounding siren. We have not—I say again—have not contacted the *Wanderer* as yet. Over."

Louise sat up quickly. "Do you suppose that's Bill and Marilyn and little Julie?" she asked.

"I don't know," I answered, with a strange sinking feeling in my stomach. "Let's listen."

"Roger 350, stand by."

"Coast Guard 452. Coast Guard 452. This is Coast Guard Radio Long Beach. Coast Guard Radio Long Beach. Are you receiving me? Over."

"Radio Long Beach, this is 452. Go ahead."

452, Coast Guard Radio Long Beach. Could you pick up the *Rickey II* in the vicinity of Santa Ana river on your way into Newport Bay? Over."

"Radio Long Beach, this is 452. Negative. I say again, negative. There are too many boats out here. The danger of crossing our tow line is too great. We would prefer to dock the *Feliz* first. Did you receive? Over."

"Roger, 452. Call in when you have docked the *Feliz* and are on your way out. Radio Long Beach, out."

"*Rickey II, Rickey II*. This is Coast Guard Radio Long Beach. Did you receive that transmission? Over."

"Roger, Radio Long Beach, we did receive. Thank you, we are in good shape and will wait our turn. Thank you again. This is *Rickey II* off and clear with the Coast Guard."

"Calling the *Wanderer*. Calling the *Wanderer*. This is Coast Guard Radio Long Beach. Come in please."

"Coast Guard Radio Long Beach, this is the *Wanderer*. Over."

(continued on page 80)

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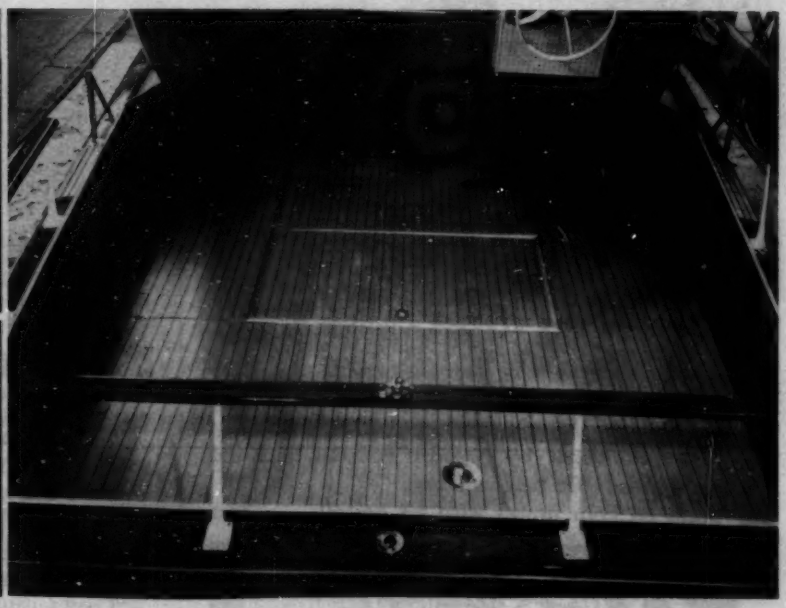

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CAPITOL GEARS, INC., St. Paul, Minnesota

VISIBILITY *(continued)*

"*Wanderer*, this is Radio Long Beach. Cutter 350 is approaching your vicinity. Can you hear their siren? Over."

"One moment, Radio Long Beach. I will go on deck and listen. Over."

"Does it sound like Bill to you?" Louise asked me.

"I don't think so," I lied. But only too clearly in my mind I could see Marilyn and Julie sitting tense and silent on the bunk while on deck Bill strained to hear that siren above the breakers' roar.

It seemed like hours before I hear Bill's voice again.

"Coast Guard Radio Long Beach, this is the *Wanderer*. I think I hear the siren. Over."

"Roger, *Wanderer*. Will you try to contact Cutter 350 please? Coast Guard Radio Long Beach out."

If it was Bill, his voice sounded tired.

"This is the *Wanderer*, this is the *Wanderer*. Calling Coast Guard Cutter 350, Coast Guard Cutter 350. Come in please."

"*Wanderer, Wanderer*. Coast Guard 350, Coast Guard 350. I hear you loud and clear. What is your condition? Over."

"Coast Guard 350, this is the *Wanderer*. We went aground outside the breaker line about 530. I think our rudder is gone, otherwise we are all right. We have an anchor out astern. Over."

"Do you have a bright light? Do you have a bright light? Over."

"Yes, over."

"Will you flash it please? Will you flash it please?"

"Standby, 350."

It seemed like another hour went by. "They'll never make it," I thought, "before that beautiful yawl breaks up."

"*Wanderer*, this is Coast Guard 350. Your light is visible now. We will lower a boat and bring you a line. Keep flashing the light. Over."

"Roger, 350. *Wanderer* is standing by."

The channel continued busy with other calls, but I was no longer a casual listener. All I could remember was the love and labor as well as money that Bill and Marilyn had lavished on *Wanderer*, and how many times I had heard him say "No insurance for me. I'll put the money into ground tackle and a radio."

IN THE NOVEMBER ISSUE

Carleton Mitchell, one of leading yachtsmen of the 20th Century, adds excitement to the pages of Popular Boating with "Phantoms in the Windward Passage."

"They've had it," she said, "haven't they?"

I was too sick to lie. "I wish I could say no." I knew the fix they were in could hardly be worse. There was a chance in a million if—and it was a big if—everything went off perfectly the first time. If no mistakes were made they might get her off before the tide went out much farther and she started to pound. Then I remembered Spider and Joe in the store. "My God," I thought, if kids like that are running the show, they'll forget something vital and Bill and Marilyn's dreams will die in the surf. My coffee was suddenly cold and bitter in my mouth.

"*Wanderer, Wanderer*, this is Coast Guard 350. When the men throw you the small line, pull it in. You will come to a 3″ hawser. Pull that in also. When you come to the 6″ hawser make it fast to your mizzen mast and stand by. Over."

"Roger 350. *Wanderer* standing by."

"Hurry," I thought. "Hurry! Maybe there's still time."

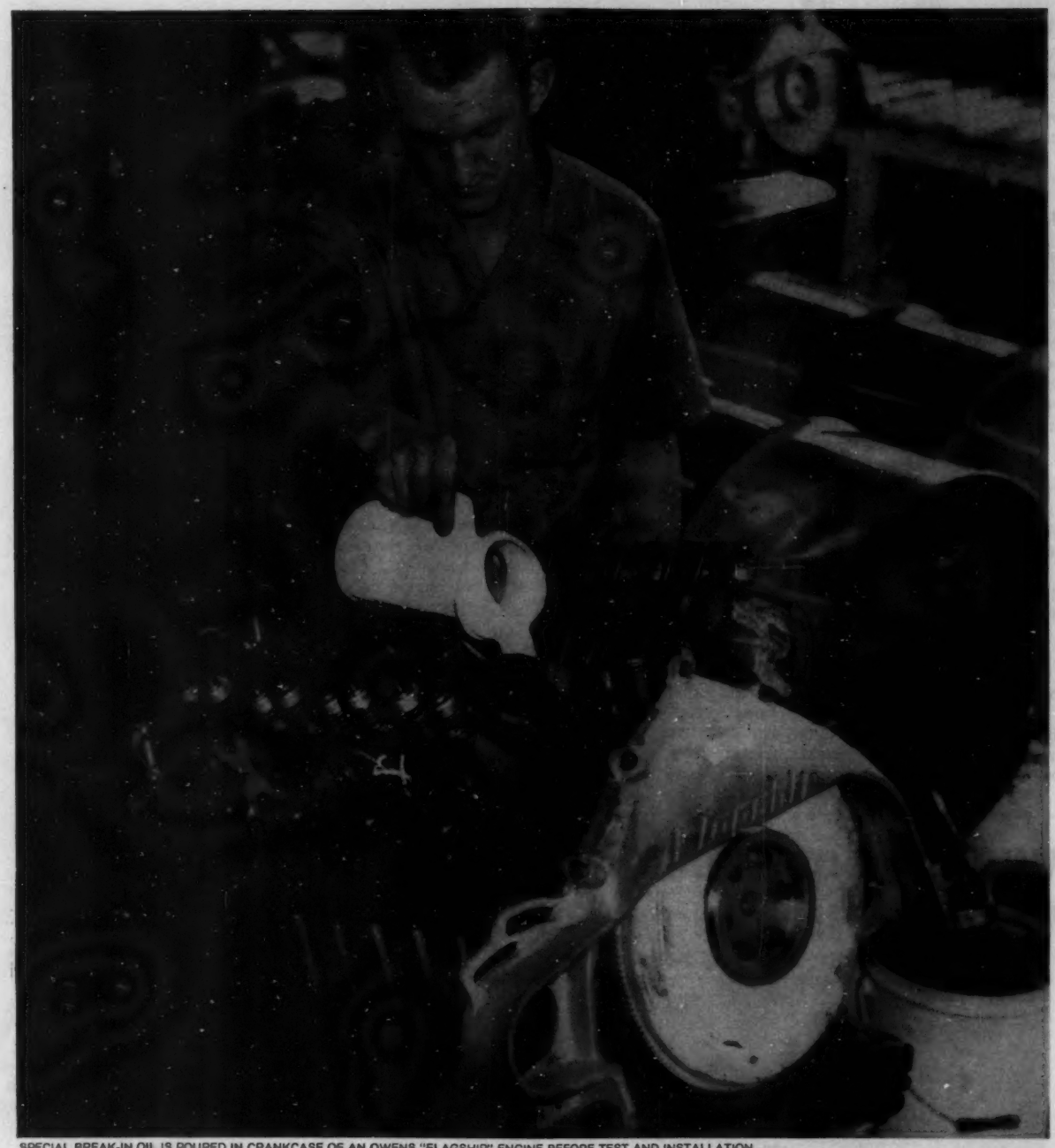
"Coast Guard 350, this is *Wanderer*. The line is fast to the mizzen mast. We are beginning to pound on the bottom. Over."

I could tell Bill was trying to keep his voice calm.

"Roger, *Wanderer*, as soon as the small boat is back we will haul away. Stand clear. Coast Guard 350 out."

The minutes dragged by into what seemed like hours.

(*continued on page* 82)



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That's why Texaco Marine Products are recommended highly by Owens Yacht Division of Brunswick Corporation and other leading boat and marine engine manufacturers. And why you'll get better performance and longer life from your engines and equipment by using these superior products.

Look for the red star and green "T," sign of your neighborly Texaco Waterfront Dealer. Remember, you always buy the best when you buy **Texaco**

VISIBILITY *(continued)*

Finally, when I heard Bill's voice again, there was in it a deadly weariness and resignation.

"Coast Guard 350, this is *Wanderer*. It's no use, the line parted. We are pounding badly now. Maybe you should send the small boat and take my wife and daughter off."

"*Wanderer, Wanderer*, this is 350. We are retrieving the line. Stand by."

In the silence that followed, Louise said, "Turn it off please, it's too awful!"

But I had to hear it all. At least I must know if the three of them got off all right before the *Wanderer* broke into pieces. The minutes ticked into half an hour. I heard the other cutter make contact with *Rickey II*. Small consolation. The Coast Guard had failed in the only mission I really cared about. My anger and helplessness was a lead weight in my chest. To them it was probably just another boat. So they couldn't save all of them. The percentages were probably all they cared about anyway. Write off one little white yawl and go after the next one.

At last I heard the cutter again.

"*Wanderer, Wanderer*, this is Coast Guard 350. You tied the 3″ line instead of the 6″. This time we will put a man on board. We will put a man on board. Will you flash a light, flash a light so the men in the boat can find you? Did you receive? Over."

Bill's voice seemed a great way off when he answered, and his transmission was interrupted. His battery is almost gone, I guessed.

"This is *Wanderer*. Roger, but . . . hopeless. Please . . . wife and daughter off. Over."

"Roger, *Wanderer*, we will remove the crew. Please flash the light. 350 out."

Louise and I could think of nothing to say in the long silence that followed. She poured me another cup of coffee, and as I sipped it I could not keep pictures of what I knew was happening from my mind. The boys in the boat piled high with heavy line. The struggle to keep the boat from broaching in the breakers, and Bill, Marilyn and Julie waiting in orange life jackets, flashing the light and peering into the deadly gloom. Then the boat alongside, banging against the *Wanderer's* smooth white planking. The boys helping the woman and little girl into the boat. And then, my God! then Bill turning and looking at his little boat, almost on her side, pounding against the merciless bottom. Maybe even as he watched that beautiful varnished mast was splintering and falling.

I knew there would be no more transmission between the cutter and *Wanderer*, but I left my receiver on to hear them report that all hands had been safely removed. Silently we prepared for bed. The clock struck midnight. The radio was quiet. All who could get in, were in.

I must have dozed, because I awoke with a start. The cutter was reporting in.

"Coast Guard Radio Long Beach, Coast Guard Radio Long Beach. This is Coast Guard 350, Coast Guard 350. We are two miles south of Alamitos jetty. We have the *Wanderer* in tow, we have the *Wanderer* in tow. All hands are in good condition. The boat's rudder is damaged but otherwise *Wanderer* is all right. Over."

"How in God's name could he be so calm about it," I wondered, as I shook Louise to waken her.

"I heard," she said quietly.

"Roger, 350. This is Radio Long Beach. Notify when mission completed. Coast Guard Radio Long Beach, out."

Sunday afternoon I called Bill to congratulate him.

"Everyone is all right," he said sleepily. "Even *Wanderer* only has a bent rudder post and a dented keel. I wish I knew how to thank the Coast Guard. They're a real bunch of heroes for my money."

"By the way," he continued before he hung up, "I need the name of a good insurance man."

"I'll find you one," I said, grinning, "now go back to bed." — ⚓

Why Owens Cruisers Are Equipped With MONEL Alloy 400 Shafts And Tanks....

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THE BLOCK ISLAND 40

RACE	POSITION	BOAT
Annapolis – Newport	First	B.I. 40 Reindeer
Marblehead – Halifax	First in Class	B.I. 40 Reindeer
New Bedford Whalers	First	B.I. 40 Swamp Yankee
Martha's Vineyard Ocean Race	First	B.I. 40 Swamp Yankee
Newport – Cuttyhunk	First	B.I. 40 Volta
Storm – Trysail	First in Class	B.I. 40 Scylla

Remember also the six out of the first eleven places in the Newport-Bermuda Race.

Now let's look at the record of the Block Island 40's glamorous companion.

THE GALAXY 32

RACE	POSITION	BOAT
Demarest Lloyd Trophy –		
New Bedford Yacht Club	First	Galaxy 32 Juniper
Beverly Yacht Club Regatta	First	Galaxy 32 Juniper
Deep Water Sailing Club	First in Class	Galaxy 32 Alcyone
Patton Bowl	First in Class	Galaxy 32 Alcyone
Edgartown Regatta	First in Class 2 days combined	Galaxy 32 Juniper

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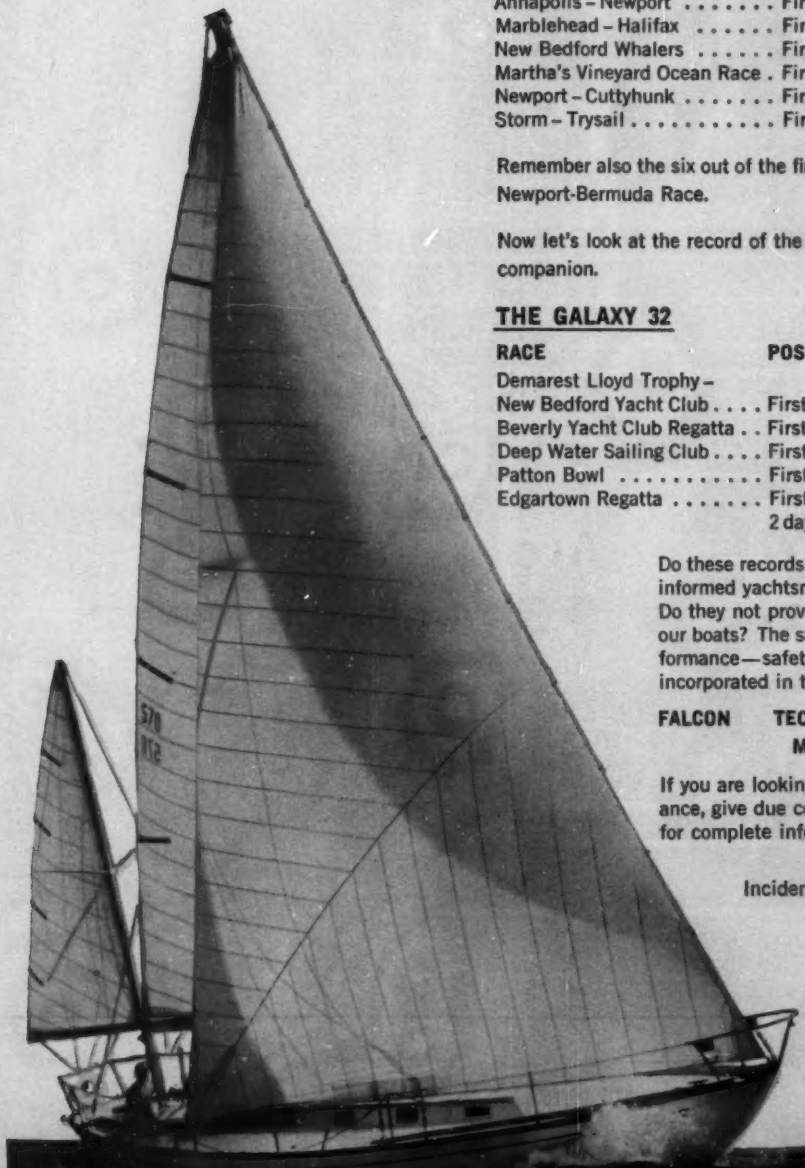

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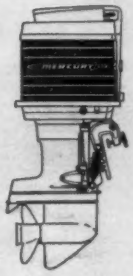

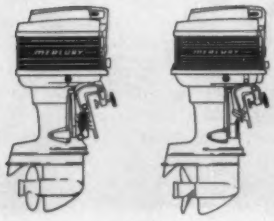

the new 50 hp Merc 500 . . . and the new attractively-priced Merc 450 . . . 45 hp . . . 4-cylinder in-line engines, streamlined from powerhead to new Jet-Prop exhaust. • Mercury's new Glide-Angle 2-cylinder motors include the Merc 250 . . . 25 hp . . . a light, handsome work horse for fishing, hunting . . . even skiing. Then there's the entirely new Merc 110 . . . 9.8 hp . . . in a 55-pound package . . . 20% lighter than other 10's and

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POPULAR BOATING tests

THE WHIRLWIND

The hull of the 20-foot test boat lifts more than half way out of the water when throttle is wide open.

MOLDED plywood construction is the main feature of the Jupiter, one of eight Whirlwind models manufactured by Molded Products, Inc., of Cockeysville, Maryland. All are constructed of molded Philippine mahogany veneer laminated into a single hull. The hulls are laminated over a male pattern, called a mandrel. The Jupiter hull is made up of seven 1/16-inch thick plys, each ply stapled at a 90 degree angle to the preceeding layer. Each strip of plywood veneer is coated with a carefully regulated amount of glue. When all seven layers of the layup have been applied, the "uncooked" form is covered with canvas, then enclosed in a rubber bag. This sheathed mandrel is rolled into a 30-foot long, 25-ton pressure cooker, called an autoclave. Steam is introduced to provide pressure and heat. Pressure is regulated to approximately 70 pounds per square inch; temperature is held to a range of 270-300 degrees F. for 45 minutes.

In the heat and pressure, the phenolic resin glue coating on the plywood veneer melts and flows into the crevices between strips of veneer, and into the pores of the wood itself. At the end of the cooking cycle the rubber bag and canvas are removed, and the hull is jacked free of the mandrel. All staples on the surface are removed, and the hull is sanded. It is then ready for stiffening members. In general the strength of the molded hull is equal to approximately three times that of the same thickness of solid planking of similar material.

The Jupiter, a 20-foot two-sleeper cabin cruiser, has a 95-inch maximum beam. Displacement is 2300 pounds with an 80 horsepower Gray Marine engine and Eaton Powernaut drive unit.

JUPITER-'20'

By Hank Wieand Bowman

POPULAR BOATING

RATING FACTORS BOX SCORE	Excellent	Above Average	Average	Below Average	Poor
Safety	✓				
Comfort			✓		
Adaptability		✓			
Durability			✓		
Styling		✓			
Performance	✓				

Test-author Bowman takes notes on materials and methods of construction from Charles Wingo, one of three partners of the company that makes the Jupiter. The use of laminated safety glass and sliding Plexiglas cabin windows were two of the many features that resulted in the Excellent Safety rating indicated above. The optional addition of the stainless steel bow rails also added to the high rating in this category.

Factory equipped, including the Gray-Eaton installation, this model lists at $4175. Standard equipment includes a complete galley with icebox, stove and sink; fresh water system; bunks; mattresses; dinette table which converts to a third bunk; steering; instrument panel; deck hardware and lights. Two optional extras are shown on our test boat: the stainless steel bow-rail, and the folding Navy top, which is sold with side and aft curtains.

We rated the Jupiter excellent in the *Safety* category. Her windshields, which open, are constructed of laminated safety glass; sliding cabin windows are Plexiglas. The 24-gallon gasoline tank, constructed by Allied Metal Specialties, is properly vented and the filler line is equipped with a bonding ground to the engine. The asbestos shielded two-burner alcohol stove is of an approved type, safe for marine use. The bilge is well-vented, with scoops at all four corners under the cockpit flooring to get air into and out of the engine compartment.

Lowest measurement from cockpit deck to top of coaming is 27 inches, so it is virtually impossible for small children to tumble overboard. The cabin, with 62 inches headroom forward and 65 inches aft, is free from any jagged protrusions or awkwardly placed fittings. The cabin top, constructed of ⅜-inch molded plywood, is notably free of any protrusions. The inherent strength of molded construction makes it possible for three fore and aft supports to provide all the stiffness required, so that carlings, which often present head-bumping obstructions, are eliminated.

The cabin floor is coated with a Burlington Mills vinyl featuring a non-skid imprint, and the

(continued on next page)

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TEST *(continued)*

cockpit deck is finished with non-skid deck paint. There are no metal trim strips underfoot to cause cuts or toe-stubbing. The cabin top is fitted with well-designed hand rails on both sides.

Our rating of excellent for safety is partly based on the inclusion of the stainless steel bow rail a $72 optional extra. This is of high quality construction, with chrome bronze fittings throughout. The carefully-buffed rails are secured in the fittings with stainless-steel Allen set screws.

For *Comfort*, we rated the Jupiter average. She was dry under all test conditions. Her engine and hull noise level is reasonably low, though engine noise could be reduced even more if the builder would provide a liner of sound-dampening materials to the inside of the motor box.

With the Navy top installed, metal-on-metal rattling at frame supports set up a twanging like a cracked guitar sounding board. Any owner could probably eliminate these annoying vibrations by shimming the frame fittings with some form of gasketing, but the problem is one that should be tackled by the manufacturer.

Cabin layout incorporates two bunks, each 6′3″ long, plus a dinette table which can be dropped in place between the 2 V-bunks. This setup will sleep two persons in comfort, three if they don't mind crowding.

The cabin is lacking in storage compartments, though there is space under the bunks which could have been utilized. The area below the cabinet top includes a roomy icebox and a locker adjoining the cabin bulkhead. The storage cabinet is intended for galley utensils and food, and has no shelves. No provision has been made for a chart table, nor are there any handy lockers under her covering boards along the sides, or under the 14½″ wide after deck area.

The motor box is a comfortable 17-inch height above the cockpit deck. If the entire cockpit were altered so as to provide a continuous stern seat, the under-seat areas could provide storage space for life jackets, mooring lines and other miscellaneous gear.

However, since this boat is of wood construction, it is one that's easy to customize.

One particularly thoughtful cabin installation is the reversible bunk pads. Bodies of the mattresses are constructed of a poly-foam which will not crumble or absorb moisture. Exposed sides of bunk pads are neatly upholstered with a U. S. Naugahyde vinyl covering. The undersides have a canvas facing so that pads may be reversed for cooler sleeping during hot weather.

Another thoughtful provision is the space-saving folding door to the head. This is fabricated of aluminum slats finished with an attractive printed pattern. Only one light is provided in the main cabin. This fixture is located against the bulkhead above the galley. Though it is large enough to fully light the cabin, no reading lights are provided.

The cabin door, which measures 19½ by 51 inches, features a combination drop down glass-screen panel. This is fine, but the dimensions of the vented area are too small, thus miminizing its value. Screens are available for the hatch and side windows for $19.

In the *Durability* classification, the Whirlwind Jupiter rated above average. Her sturdy, one-piece hull won't require caulking, is tougher than similar hulls of sheet panel plywood construction. Hardware used throughout is of top quality. Hull sides are finished with U. S. Yacht eggshell white with copper bronze anti-fouling paint on underwater surfaces. All exposed natural finish surfaces are treated with resin base hot varnish.

The galley pump is an excellent quality fixture by Peters & Russell; the head, which has exceptionally good pumping power, is of a new, improved Groco design. The mahogany-spoked helmsman's wheel contains no ferrous parts, and is built by John Rohrbaugh. All deck hardware is chrome over bronze. The sink, by Vollrath, is of stainless steel.

The upper portion of the Eaton Powernaut drive unit is barely visible through the spray. Author felt that performance would be better if balance were improved between drive and forward boat weight.

The galley top is of Formica, and the cabin roof is covered with Nautolex bedded in Dolphinite cement.

Side windows should be water tight under nearly all conditions. The panes operate smoothly in anodized aluminum tracks that are fitted with anti-rattle, mildew and rot-proof synthetic fabric liners.

Keel construction is 2 x 6 inch solid mahogany, with laminated mahogany plywood stem and four mahogany sister keels, 1¼ x 2 inches. The Becket steering pulleys are secured by bolts. The Eaton Powernaut drive features 180 degree rotation so that in wet storage the unit may be swung upright as a precaution against marine growth or galvanic corrosion. Trim lines and boot-topping are of self-adhesive Minnesota Mining tape, and should outlast painted striping.

In only minor features does the Jupiter fall short of an excellent durability rating. For example, the anti-vibration gasketing around the rear of the motor box is an adhesive foam tape. In moving the box during fuel consumption tests, the tape was torn free. A high quality Autolite battery is provided, mounted in a plywood battery box. There are no hold down straps or clamps, and underway in rough water the battery bounces about and very probably would be damaged in sort order.

The folding aluminum door for the head operates on steel tracks. These tracks will need constant attention to prevent rust. The galley stove is also constructed largely of pressed steel, and is also liable to lose its finish and rust.

The Jupiter rates average in *Adaptability*. She is sufficiently maneuverable and offers enough speed to serve as a water ski boat, though this certainly was not the purpose for which she was designed. With the accessory top, side curtains and aft curtains a family group of two adults and two children—or any party of four—can comfortably cruise in protected waters if two were to bed down in sleeping bags in the cockpit.

Cockpit length is 92 inches; width is 82 inches. The stern-mounted inboard-outboard engine unit and engine covering box occupies only a 26 x 26 inch square unit at the after end of the cockpit.

The uses to which an owner of the Jupiter can put her will be equivalent to that of any good quality, thoughtfully laid out 20-footer on the market.

Her *styling* is a bit cleaner than most 20-footers in her price range, and rates above average. The slope of her main cabin windshield, that of the flying bridge windshield, her bow lines and her cabin glass all blend naturally to form a more pleasing general appearance than most like-sized

(continued on next page)

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cruisers. The only detracting feature in her styling is her tendency to carry her bow high at mid-range speeds. She does not, however, rear so high as to interfere with the helmsman's vision. The wheel position is comfortable, as is the Garelick Helmsman's seat.

She misses an excellent styling rating on the basis of minor features only. For example, no simple access is provided to her binnacle box. Both the lower front section and the top may be removed, however, to add wiring for additional lights or to change fuses will be difficult for anyone with normal size hands and wrists.

There are hidden features that make up for such shortcomings. The entire icebox, for example, which all too often lacks adequate insulation on craft this size, has been lined with a one-inch thickness of Styrofoam.

In the *Performance* category, the Jupiter showed off very well and earned an excellent rating. The Eaton outdrive gives her the same port and starboard control in reverse that one has with an outboard. When operators of inboard 20-footers fitted with single screws are fretting about handling chores during dockside maneuvering, Jupiter helmsmen will find their task easy.

Out in open water I put the Jupiter into full throttle, gently-radiused turns both port and starboard, with my hands off the wheel. I tried radical changes of throttle settings in order to encourage the boat to fall off into a violent turn, or to spin. She just won't misbehave. The Jupiter holds a true course with no display of temperamental torque tenderness. I didn't detect any crankiness in water conditions that ranged from flat calm to approxi-

How well do you know your chart symbols? Check yourself with Elbert Robberson's Seamanship Quiz in the November Popular Boating. On Sale Oct. 31.

mately a foot and a half chop, as we moved from our initial test area at Riley's Yacht Inn on Middle River, near Essex, Md., to our speed and fuel consumption runs on Chesapeake Bay.

In running over cruiser wakes she pounded, but not excessively. A 2600 pound 20-footer isn't intended for blue water use. On waters for which she is designed, such as protected lakes, rivers or bays where runs to protected coves and harbors are never too distant, she will carry herself proudly. In a pinch she can handle rough going.

Both speed runs and fuel consumption tests were conducted with four persons aboard, which would be an average comfortable load. The four-cylinder Gray engine is rated at 80 hp at 3800 rpm. She fell 200 rpm short of this with a 14" x 11" Michigan propeller. However, the wheel selection is a good one for the engine was still stiff, and had only a half-hour's on-the-water running time, prior to our testing.

At 3600 rpm maximum speed indicated with our Aqua-Meter speedometers was 24.5 mph. Two separate meters, both carefully calibrated, were used. Though the manufacturer makes no speed claims for the Gray-Eaton combination, I think it is quite possible that the Jupiter will peak out close to 26 mph under lightly loaded conditions once the engine has been broken in.

Fuel consumption tests indicated that the 24-gallon capacity fuel tank offers a minimum cruising range of 100 miles at most speeds. At the most economical cruising speed recorded, 13 mph, cruising range is slightly more than 117 miles.

I do feel that the Whirlwind Jupiter could be somewhat modified to attain the best advantage from the inboard-outboard combination, which concentrates engine and drive weight at the end of the hull. When galley stores, clothing and other gear are loaded into the cabin, better balance may be achieved and the already fine performance of the Whirlwind may be further enhanced. — ⚓

Fighting the St. Lawrence River in the Thousand Islands International Outboard Marathon—June 11

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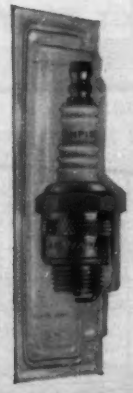

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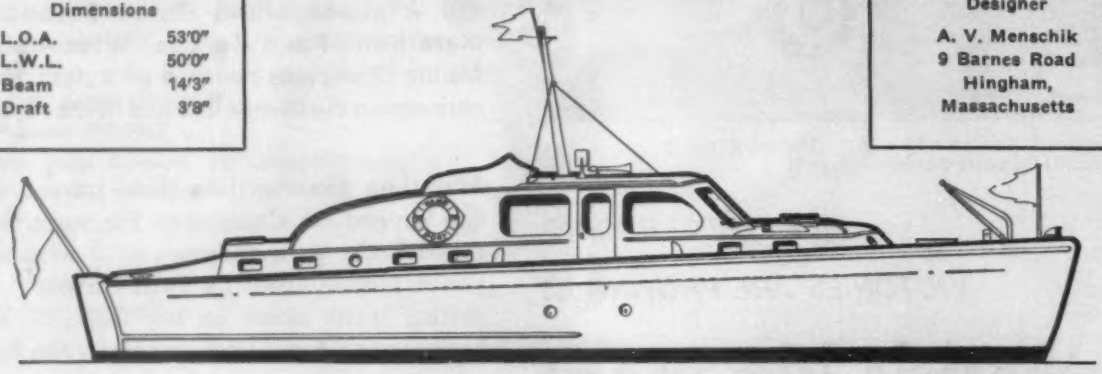
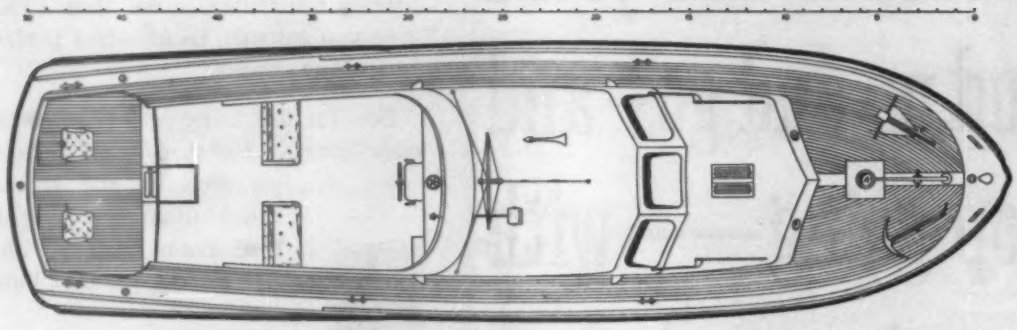
Start of the Winnebagoland Outboard Marathon—June 25

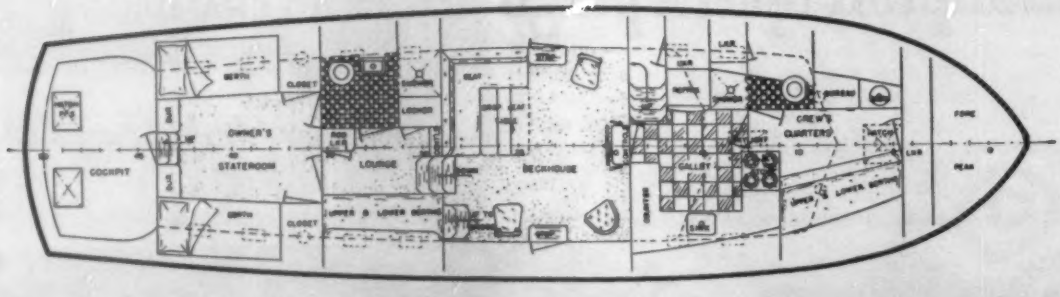
DIESEL CRUISER BY MENSCHIK

Dimensions	
L.O.A.	53'0"
L.W.L.	50'0"
Beam	14'3"
Draft	3'8"

Designer
A. V. Menschik
9 Barnes Road
Hingham,
Massachusetts







THIS design was based on the owner's requirements for accommodations for four plus a crew of two. Mr. Menschik has filled this requirement by designing a cruiser with spacious, comfortable quarters offering an "apartment living" atmosphere. The crew quarters forward has two berths, adequate lockers and a separate toilet and shower. The galley area is uncluttered and equipped with a gas range, refrigerator, deep freeze, hot water heater, lockers and plenty of counter space. The deckhouse, in addition to the usual furnishings is equipped with an auxiliary set of controls for use in sloppy weather. The layout of the owner's and guest's staterooms aft provide privacy and comfort. Construction specifications call for mahogany planking, teak decks, oak framing and keel and fastenings of silicon bronze. The engines and auxiliary equipment are located under the deckhouse floor, and power is provided by twin GM 6-71 diesels which produce a top speed of 20 knots. An Onan diesel generator produces power for electrical units. The boat is owned by John R. Tobias of the British West Indies and was built by Southampton Shipyards, East Quogue, New York.

Full Safety Tilt allows kick-up above boat bottom avoiding damage from underwater objects and shallow water. Locks up for beaching.

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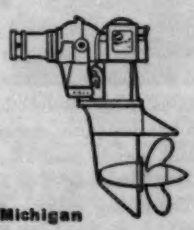
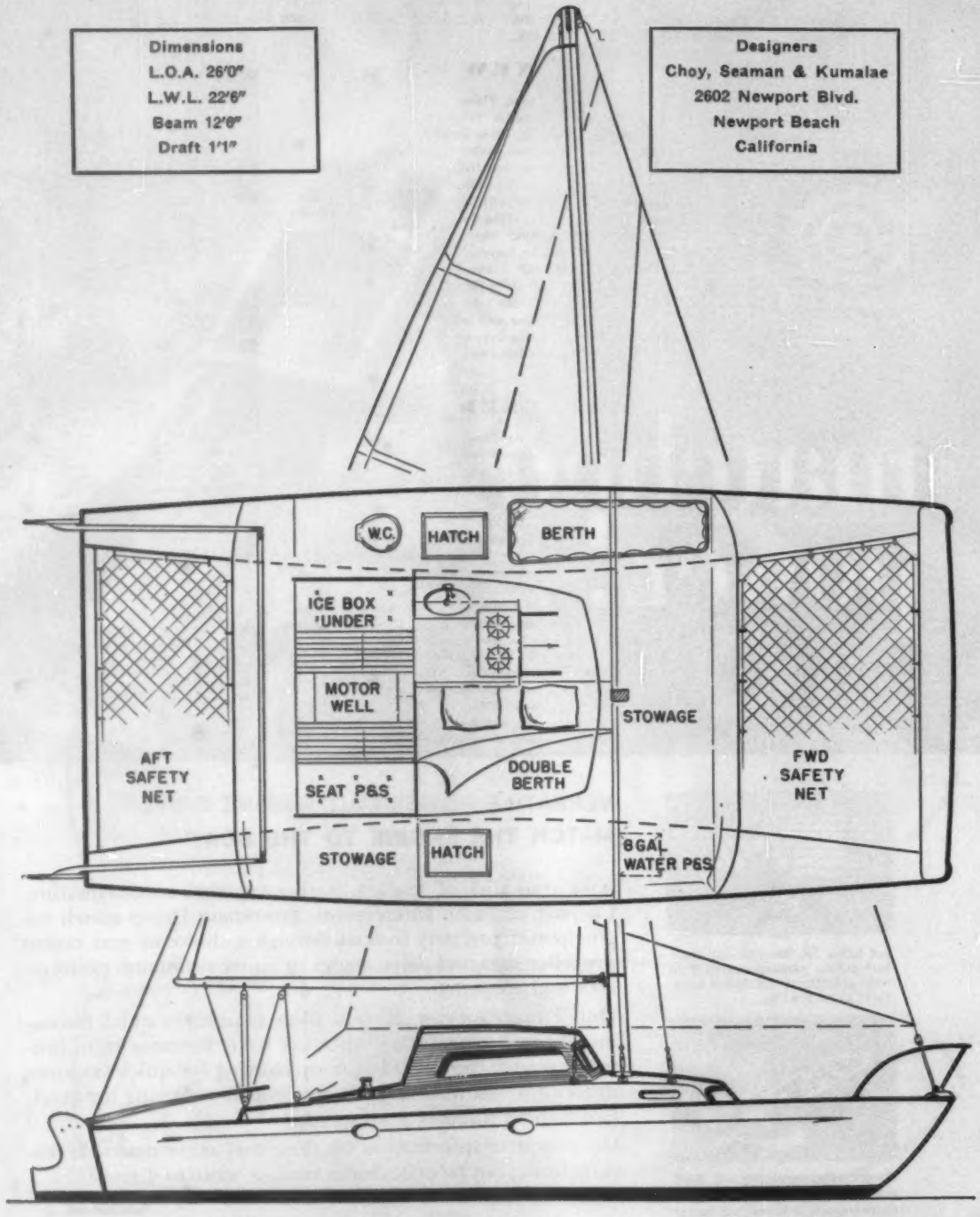


EATON MANUFACTURING COMPANY, Saginaw, Michigan

CATAMARAN FOR THE AMATEUR BUILDER

Dimensions
L.O.A. 26'0"
L.W.L. 22'6"
Beam 12'6"
Draft 1'1"

Designers
Choy, Seaman & Kumalae
2602 Newport Blvd.
Newport Beach
California



THIS CATAMARAN was designed with the specific purpose of providing a small cruising vessel which can be built economically by amateur boatbuilders with some experience and good shop facilities. The boat is equivalent in accommodations to the conventional midget ocean-racers. According to her designers, her performance is in keeping with the potential speeds that all properly-designed catamarans are capable of attaining. The boat is not meant to be competitive with day-racing catamarans since the conservative sail plan, greater beam and heavier displacement are intended to provide greater safety at sea rather than peak performance. Auxiliary power is provided by a 10-horsepower outboard. *Foamy*, a successful 24-foot catamaran, was selected as a prototype model for this new design. *Foamy* sailed 1,425 nautical miles from San Diego, California, to Acapulco, Mexico, in January 1958. The 26-footer is of asymmetric-hull design. According to the designers, this type of hull offers good stability and ease of handling.

Special trading opportunities . . .

This is the time of year we like to reduce inventory. So you may help us do so, if you are interested in a new or different boat, we list below some of the items in our current stock.

These are boats owned by the yard on which we'll give maximum trade-in allowance for your present boat:

31' BayHead SKIFF Caribbean Cruiser, twin 300hp Crusaders, new showboat, all teak decks, Monel tanks & shafts, sleeps 6, all elec. galley, hot shower, 2 elec. refrigerators, teak bar, elec. roto-oven, elec. chlorinated toilet, vanity, blonde butternut & walnut interior, CO2 system, air horns, depth, bilge and engine alarms, sniffer, Monel fish well. The ultimate personal boat. Trades accepted —here.

42' CHRIS-CRAFT 1955 Express Cruiser, twin 151hp GM 4-71 diesels, teak decks, radiophone, shower, outriggers, converter, autopilot, depth-sounder, sniffer, hot water—trades considered—Here.

35' HUBERT JOENSON 1958 Express, twin 225hp Chrysler Imperials, teak decks, Monel tanks & shafts, teak pulpit, sleeps 5, Kidde CO2 system, radiophone, Rockaway fighting chair, Rockaway outriggers, fish well, 110-volt wiring, trades—Here.

37' ADAM PRICE 1955 Flybridge Sedan, twin 200hp Chrysler Imperials, teak decks, sleeps 5, elec. toilet, shower, elec. refrig., gas stove, radiophone, RDF, fish chairs, outriggers fish well, pulpit, converter—Here.

36' EGG HARBOR 1957 Trunk-Cabin Cruiser, twin 125hp Chrysler Crowns, sleeps 5, radiophone, depth sounder, belly rail, 110-volt wiring—turned in on new Egg Harbor—will trade—Here.

NEW

40' WHEELER Convert. Sedan, Flying Bridge, 225hp Chryslers
35' WHEELER Convertible Sedan, 177hp Chryslers
33' CRUIS-ALONG Eldorado, 225hp Graymarines
30' BayHead SKIFF Caribbean, 300hp Crusaders
29' CRUIS-ALONG Flybridge Gulfstream, 188hp Grays
26' WHEELER Fibreglas Cruiser, 188hp Gray
26' JOHNSON BROS. Shelter Skiff, 225hp Crusader
25' CRUIS-ALONG Courier, 188hp Graymarine
24' HUBERT JOHNSON "Black Jack", 188hp Graymarine
22' CENTURY Raven, 200hp Crusader
21' CENTURY Coronado with landau top, 325hp Crusader
20' JOHNSON BROS. Sport Skiff, 70hp Graymarine
19' BUEHLER Turbocraft, 185hp Interceptor
19' EVANSON Celebrity Sloop with sails
17' CENTURY Resorter, 225hp Graymarine
13½' EVANSON Enterprise Sloop with sails

USED

46' MATTHEWS 1938 Flybridge Sedan, 160hp Chryslers
39½' WHEELER 1936 Flybridge Sedan, 250hp Hall-Scott
35' HUBERT JOHNSON 1958 Express, 225hp Chryslers
35' HUBERT JOHNSON 1950 Express, 225 hp 1958 Grays
34' SILVERTON FB Sportfisherman, 275hp 1960 Crusader
34' CHRIS-CRAFT 1938 TC Cruiser, 175hp 1957 ChrisCraft
33' PACEMAKER, 1958 TC cruiser, twin 125hp, Chrysler
33' OWENS 1947 Sedan Cruiser, 145hp Chris-Craft (instl '60)
31' CRUIS-ALONG 1957 Flybridge Sportfisherman, 225hp Gray
30' EGG HARBOR 1957 Trunk-Cabin Cruiser, 125hp Chryslers
30' BayHead SKIFF 1959-60 Bimini Sportfisherman, 240hp V8s
30' CHRIS-CRAFT 1956 Sportfishing Skiff, CC 105s
29' EGG HARBOR 1953 FB Fisherman, 185hp 1959 V8s
28' HUBERT JOHNSON 1953 Shelter Skiff, 141hp Chrysler
28' HANS PEDERSEN 1949 Trunk-Cabin Skiff, 135hp Gray
27' LUHRS 1958 Shelter Skiff, 125hp Crown
22' SHEPHERD 1955 Runabout, 200hp Chrysler
21' CENTURY 1957 Coronado with landau top, 265hp V8
21' CENTURY 1955 Coronado, 250hp Cad. Crusader
19' SHELCRAFT 1958 Utility Cruiser, 80hp 1960 Mercury OB
16' CENTURY 1956 Resorter, 135hp Gray (2 of these)

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☐ I am interested in purchasing a boat of the following type: ..... (length) .....(builder) ..... (year) ..... (model) with ..... (power).

☐ I am interested in trading my boat for another one—data herewith:

	Length	Builder	Year Built	Model	Power
I have—					
I want—					

☐ Please send me information on insurance for the following yacht: ..... (length) ..... (builder) ..... (year) ..... (model) ..... (power).

Name .....
Street & No. .....
City & State .....

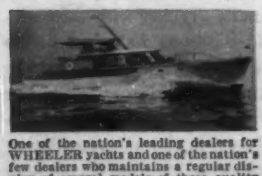
42' WHEELER 1957 Express Cruiser, twin 200hp Chrysler V8s, teak cockpit, gas stove, walk-around decks, Monel tanks, CO2 system, converter, bar and radio cabinet—Here.

35' HUBERT JOHNSON 1950 Express, twin 225hp 1958 Grays, 100-watt radiophone, Constavolt, CO2 system, 2 Rockaway Sailfish chairs, outriggers, teak decks, Monel tanks & shafts, trades. Here.

40' WHEELER Three-Stateroom Convertible Sedan with flying bridge, twin 225hp Chrysler Imperials, new 1961 showboat, teak cockpit, hot shower, walk-around decks, will trade—Here.

30' BayHead SKIFF Bimini Sportfisherman, completed Nov. 1959, twin 240hp Interceptors, Monel tanks (200 gals fuel) & shafts, all teak decks, Rockaway fighting chair, Rockaway outriggers, radiophone, large fish well and circulating live bait well, teak bar—will trade—Here.

46' MATTHEWS 1938 Flybridge Sedan, repowered in 1960 with rebuilt 160hp Chrysler Majestics, sleeps 6, hot shower, gas oven & broiler, 2 toilets (1 elec.), pulpit, aux. gener., radiophone, RDF, fish chairs, fish well, outriggers, sniffer—will trade —Here.



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Whirlwind has added the efficient, quiet-running power of the Grey-Eaton 4-cylinder, 80 h.p. inboard engine with outboard drive to its new twenty foot cabin cruiser. The result? A simply sensational ride! This new power, coupled with Whirlwind's newly designed molded Phillippine mahogany hull, means maximum power and speed with the smoothest, driest ride ever. See the results of Hank Bowman's test of this boat in this issue of Popular Boating.

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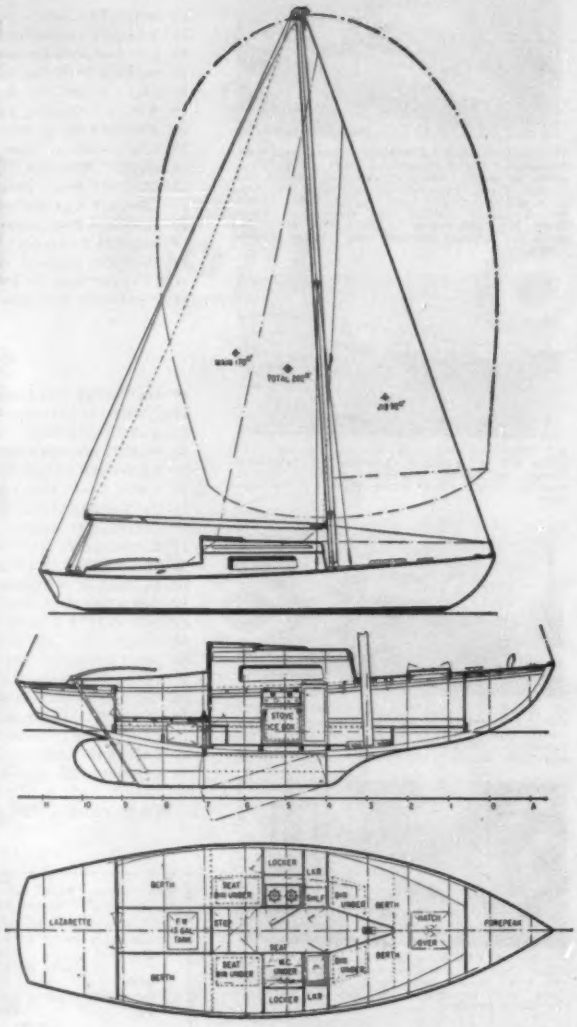
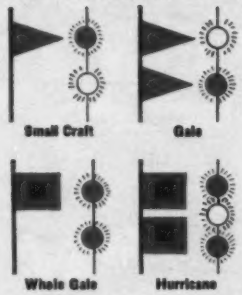
THE NEW ANDEL 24 CAN BE TRAILED



DESIGNED for the owner who wants a fast, able sailer for racing or weekend cruising, this compact sloop is the latest creation of Andel Associates, 2 O'Leary Way, Boston 30, Massachusetts. She is 24 feet overall, 18 feet 1½ inches on the waterline, has a beam of 7 feet 10 inches and a draft of 2 feet 6 inches with the board up. Sail area is 262 square feet and auxiliary power is provided by 5 to 10 horsepower outboards. The Andel 24, longitudinally framed with the bulkheads acting as the form to build the boat, has a one-piece laminated backbone from stemhead to transom, and three layers of ¼-inch mahogany planking. The designers state that the boat should be extremely easy to build. She qualifies under the MORC rules, and as shown in the accommodation plan, has four berths, a head, hanging locker, and a complete galley with a two burner alcohol stove, icebox and stainless steel sink. With the centerboard housed below the cabin sole, the sloop can be trailered. Her Monel fuel tank holds 13 gallons. Total displacement is 3,692 pounds.

DAY AND NIGHT WARNING SIGNALS



SMALL CRAFT WARNING: One red pennant by day and a red light over a white light at night indicate winds up to 33 knots and/or sea conditions hazardous to small craft are forecast.

GALE WARNING: Two red pennants by day and a white light above a red light at night indicate that winds ranging from 34 to 47 knots are forecast for the area.

WHOLE GALE WARNING: One square red flag with black center by day and two red lights at night indicate that winds ranging from 48 to 63 knots are forecast for the area.

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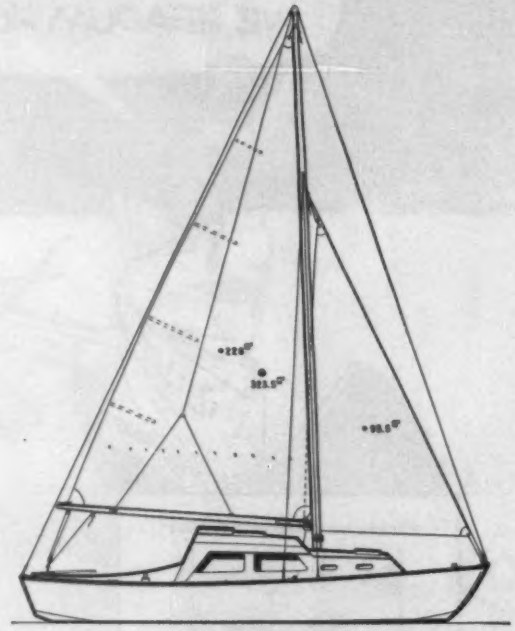
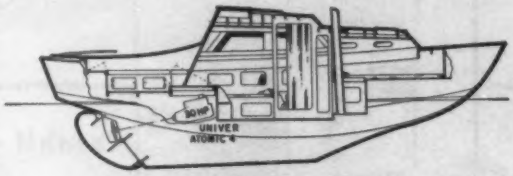
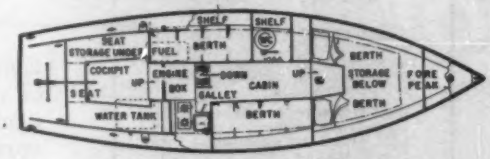
L.W.L. 23'9"
Beam 8'6"
Draft 4'0"

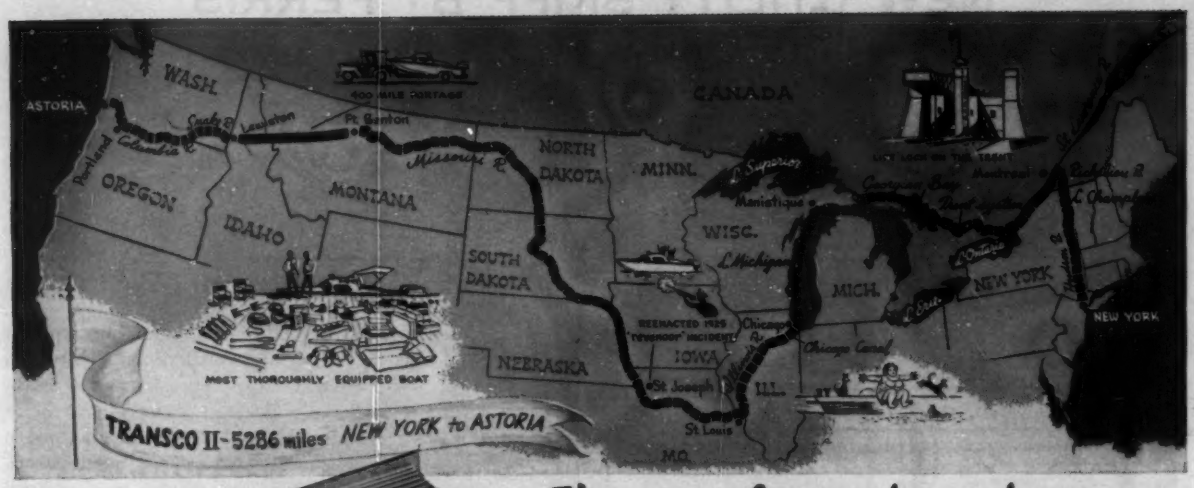
Designer
Donald H. Smith
890 Country Club Road
Crystal Lake
Illinois







DESIGNED for an amateur builder who wanted a fairly large boat with conventional planking, this sloop has a V-bottom and seam batten planking for ease of construction. Framing is white oak, and planking can be either mahogany or white cedar. She has a total displacement of 7,780 pounds including 1,900 pounds of cast lead in her keel. General handling and stability rather than speed were emphasized resulting in a somewhat minimized sail area. Auxiliary power is a 30 horsepower Universal Atomic Four. The prototype is being used by a family of four for cruising the Great Lakes, and accommodations include sleeping facilities and an enclosed head. A small galley, located at the aft end of the main cabin, has 6-foot headroom. Stowage space is available in the fore peak, hanging locker, under the berths and below the cockpit seats. Tank capacity is optional within a range of 15 to 20 gallons each for water and fuel depending upon the owners needs and expected cruising range. Plans are available from the designer for $17.



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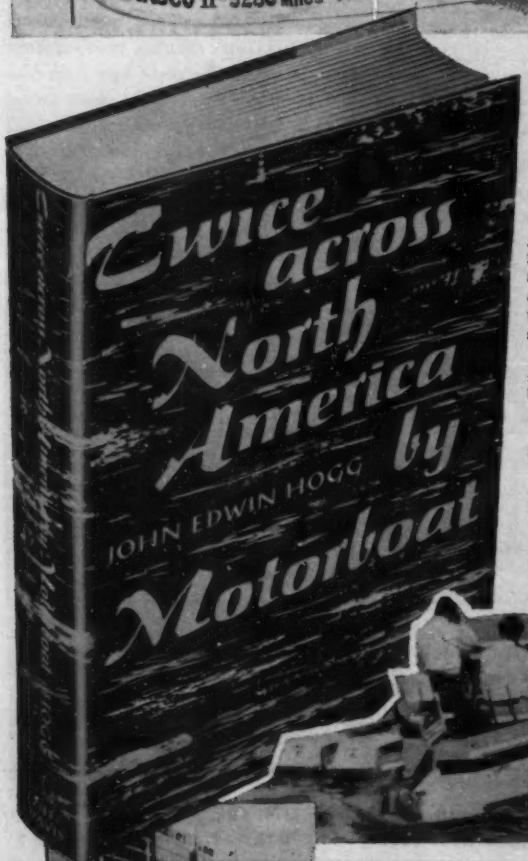

JUST imagine sailing from coast-to-coast...*in a craft less than 20 feet long!* An exciting idea, isn't it? Think of the fun you'd have—and how much you would LEARN about seamanship, piloting, and all the skills that make for an expert skipper!

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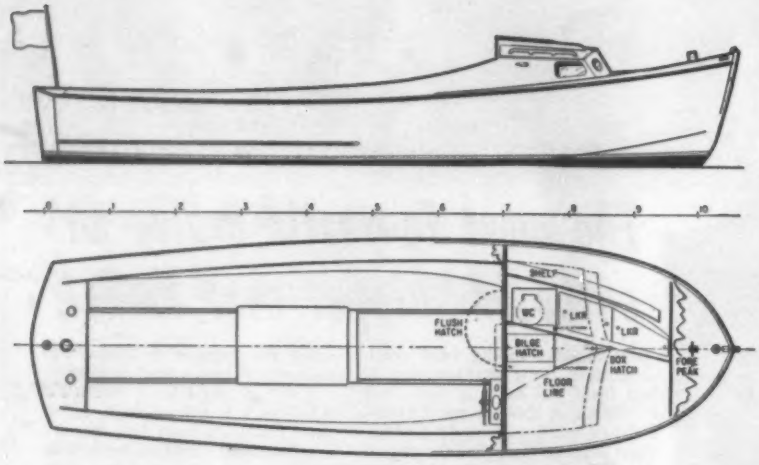

PRIMARY design requirements of this boat were rough water ability and versatility plus low construction costs. Accommodations consist of one berth and toilet with the remaining space fitted out to the owner's requirements. Mr. Ferris states that the boat's narrow chine beam and extreme bow flare plus the strength of seam batten construction and full length white oak keel allow the skiff to be powered as desired and driven hard in heavy seas. The stock design has a 188 horsepower Universal V-8 Little King estimated to push the boat at 25 mph. Cruising range is about 150 miles. The boat can be utilized as a yard boat, for water sports, fishing, limited cruising, patrol work, ferrying, yacht tender or launch work.

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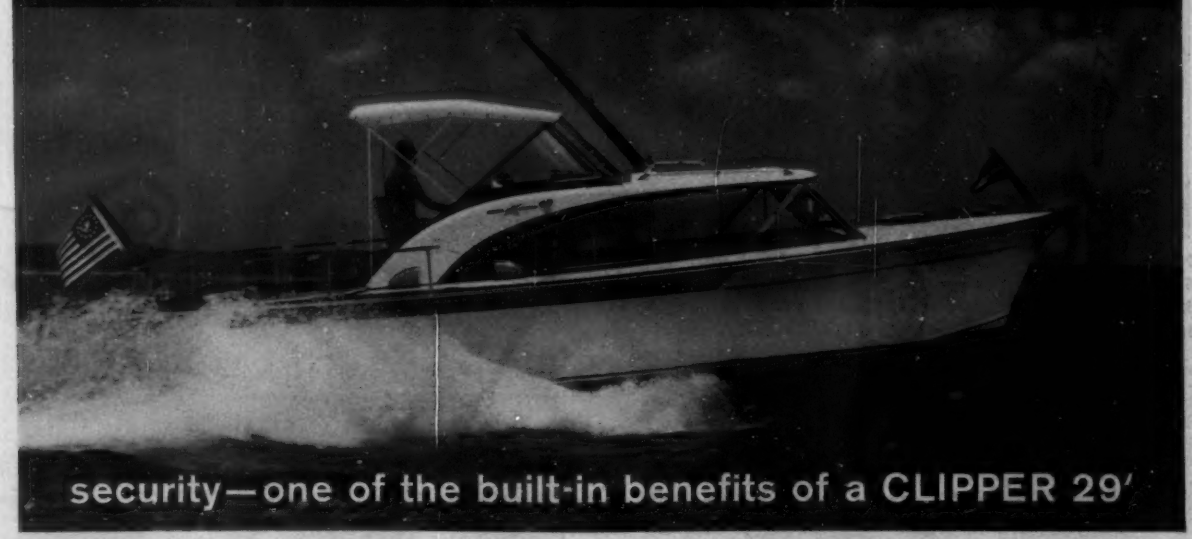

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The AWOL III, a 60-foot catamaran, was built by Aluminum Cruisers, Inc., of Louisville, Kentucky, for Cata-Marine Corporation of Bridgeport, Connecticut. Constructed of aluminum, the boat is powered by twin Gray Marine 238 horsepower V-8's which provide a cruising speed of 20 MPH. The Bridgeport firm plans a 34-foot model for marketing on a production basis.

New from Aluma Craft Boat Division, Hupp Corporation, 1515 Northeast Central Avenue, Minneapolis 13, Minnesota, is the Queen Merrie 18, powered by an 80 horsepower Volvo-Penta inboard-outboard unit.

The 33-foot Gulfstream is one of nine models being offered this year by Cruis Along Boats, Inc., 1860 Broadway, New York 23, New York. The boat sleeps four, has a complete galley, dinette and head. The planking is African mahogany.

A growing class on the East Coast is the 17-foot fiberglass-constructed Mobjack. The boat pictured above was built by the Mobjack Manufacturing Company of Gloucester, Virginia. She has a beam 6 feet 6 inches.

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You can improve the performance of your outboard engine if you clearly understand . . .

What Causes Plug Troubles

By R. J. Gail

GOT an outboard that starts hard, idles rough, or just plain "acts up" in general? Maybe you've got spark plug troubles. And then, again, maybe you haven't.

Contrary to popular opinion, spark plugs only cause trouble in outboard engines when they are completely worn out or badly need servicing.

"Nonsense!" you say. You've pulled and replaced too many fouled and overheated plugs to swallow that!

Maybe so, but did you ever stop to consider why those plugs were fouled or overheated?

As a matter of fact, most so-called "spark plug trouble" in two-cycle engines really doesn't stem from the plugs at all, but frequently is caused by malfunction elsewhere in the engine. Because, however, it usually manifests itself at the spark plugs' firing ends, such trouble is often diagnosed as spark plug trouble.

Many boat owners completely overlook the fact that the spark plugs are the last "link" in the ignition "chain," and can produce a spark only so long as the other components in the "chain" are doing their job. Let trouble develop at any "link" and the engine is apt to misfire—even with relatively new plugs.

Fouled plugs probably cause outboard owners more headaches than any other single boating problem. Yet, in most cases where plugs become fouled, some condition further back in the ignition "chain" is responsible—a bad coil or defective breaker points, for example, may cause a weak spark to be delivered to the plugs. This results in incomplete burning of the fuel mixture, which in turn causes carbon deposits to form on the plugs' firing ends. The ultimate result? A dead short and a plug misfires.

Fig. 1. Wet Fouling

Fig. 2. Core Bridging

WHAT CAUSES PLUGS TO FOUL?

Basically, there are three different types of outboard plug fouling: wet fouling, core bridging and gap bridging. Each can be traced to any one of, or a combination of, four specific engine conditions: (1) improper fuel/oil ratios, (2) "throw-off" deposits, (3) mal-adjusted carburetors, and (4) the use of the wrong type oil.

Wet fouling (see Fig. 1) is easily recognized by a damp or wet, black coating of carbon which covers the entire firing end of the plug. The most common causes of this type fouling in outboards are the use of too much oil in the gasoline being used, or improper mixing.

Insofar as the wrong fuel/oil ratios are concerned, either adding too much or *too little* oil to the gasoline can cause plugs to carbon foul.

When too much oil has been added to the gas, the firing ends of the plugs generally will be covered with heavy, damp, carbon-like deposits. A result of incomplete combustion, this condition is aggravated greatly by extended periods of idling or constant slow-speed operation, such as trolling. And, since they are highly conductive, these deposits may cause misfiring over the entire operating range.

Plugs used in an engine where too little oil has been added also will contain damp, carbon-like deposits. However, these will not be as dense as those found in cases where too much oil is used.

Both of the above conditions can be more easily spotted immediately after a slow-speed run.

PROPER MIXING IMPORTANT

Improper mixing frequently causes the plugs to become wet fouled, especially if the oil is allowed to settle on the bottom of the fuel tank and is drawn directly into the carburetor. Oil and gasoline *always* should be mixed thoroughly before it is installed in the fuel tank. This should be done by first placing all of the oil to be used in a suitable container, then adding about a third of the gas to be used, and shaking the container thoroughly. Add the remaining gas and again shake to insure distribution of oil in gasoline.

Keep in mind that plug fouling is really only a minor consequence of improperly mixed fuel, especially when you consider the other possible results. All two-cycle engines depend strictly on the correct proportion of oil being distributed with the gasoline to provide their lubrication needs. An incorrect mixture, especially if it's lean on oil, could result in serious engine damage. *(continued on page 106)*

Mr. Chase holds one of the Styrofoam buoyancy billets which float Orienta's 33 dock sections.

STYROFOAM® saves Orienta Marina $16,380 in upkeep—no replacement in 10 years!

By using Styrofoam flotation material, Orienta Marine Corporation, Mamaroneck, N. Y., saved $16,380 in maintenance and replacement costs over the past ten years.

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THE DOW CHEMICAL COMPANY DOW Midland, Michigan

Photos courtesy Champion Spark Plug Co.

Fig. 3 Gap Bridging

Fig. 4. Aluminum Throw-Off

Fig. 5. Overheating

Fig. 6. Normal Plug

OTHER CAUSES OF WET FOULING

Wet fouling also may be a result of using plugs of the wrong heat range (too cold), prolonged trolling operation, too rich a low-speed carburetor adjustment, or an obstructed induction manifold bleed-off return passage.

"THROW-OFF" DEPOSITS

Another type fouling which continually harasses outboard owners is that caused by "throw-off" deposits. These are a result of excessive combustion chamber deposits which fly off the baffles of the pistons and adhere to the firing ends of the spark plugs. They may occur in two forms: core bridging and gap bridging.

A plug suffering from core bridging is shown in *Fig. 2*. Notice that the electrodes, although not badly burned, are covered with an ash-like deposit. Also, the insulator may be "peppered" with tiny beads or small chunks of material fused to the firing end.

With gap-bridging, the spark plug is completely shorted out by combustion particles wedged or fused between the electrodes as shown in *Fig. 3*..

Both types of throw-off deposits can result from several conditions within the engine: excessive carbon in the combustion chamber, using non-recommended oils, full-throttle operation after an abnormal amount of trolling, improper fuel/oil ratios, and excessive spark advance.

Once throw-off deposits begin to accumulate in an engine, they're apt to cause continual plug fouling problems until removed. Most outboard manufacturers market a combustion chamber "purging" solvent which can be used through the carburetor to remove the deposits. However, if the deposits have been allowed to accumulate for considerable time, you may have to remove the heads and clean the cylinders and pistons manually to cure the trouble, as installing new plugs will provide only temporary relief.

ALUMINUM THROW-OFF

One other type of fouling is that caused by aluminum throw-off. While this condition is extremely rare, it may mean real trouble inside the engine. It is readily spotted by the appearance of metallic globs of gray pot metal adhering to the electrodes and bore of the plug, as shown in Fig. 4.

This type deposit is caused by a pre-ignition source within the combustion chamber which results in the aluminum alloy melting off the piston baffle. *Do not* install new plugs in such cases until you've determined the source of the pre-ignition and examined the piston for permanent damage.

WHAT ABOUT OVERHEATING?

While not as common as fouling, overheating also can present a problem. Here, the electrodes will be badly burned and gap growth will be excessive. The insulator will have a grayish-white, blistered appearance. See *Fig. 5*.

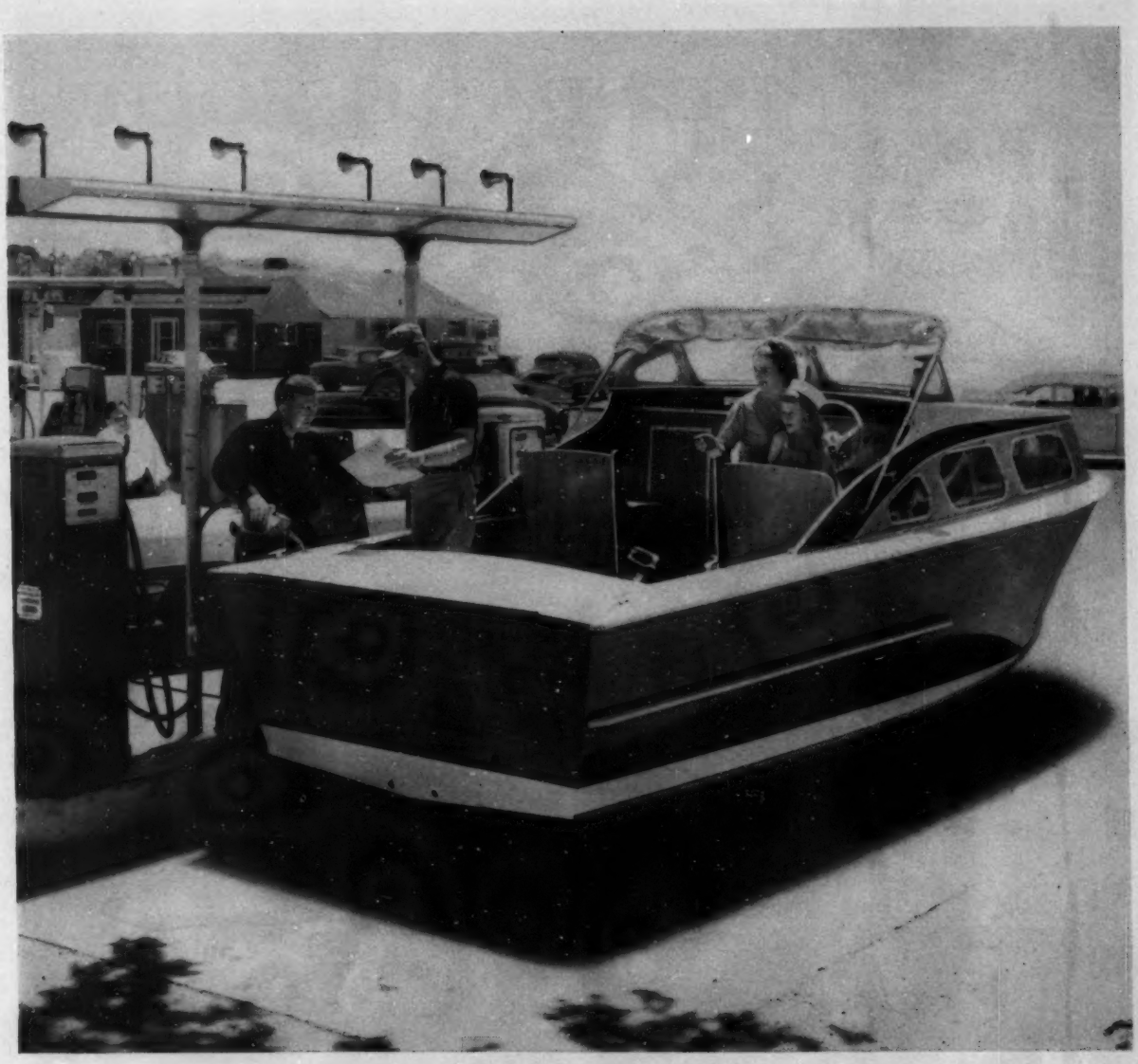
Spark plug overheating usually is caused from using plugs of too hot a heat range, a prop which is mismatched to the engine, too lean a carburetor setting, or over-advanced ignition timing. However, on occasion, sticky piston rings, a defective or worn water pump, a restricted water intake or cooling system also can cause plugs to overheat.

By now you're probably wondering whether there is any such thing as a "normal" spark plug, and there is.

Plugs which have been used in a normal engine, (providing they are of the correct heat range), will have insulators that are light tan to gray in color with few deposits present, as shown in *Fig. 6*. Their electrodes will not be burned. Plugs in this condition are an excellent indication that ignition, carburetion and cooling system are in good shape. Chances are that after filing the electrodes and resetting the gaps, such plugs can be reinstalled in the engine with good results.

WHEN SHOULD PLUGS BE CHANGED?

Insofar as the time interval between plug changes is concerned, there are no set rules when it comes to outboard engines. Plugs which may last 100 hours in one engine may last only half that time in another engine of the same type—due to a difference in operating conditions. Generally, the plugs should be replaced at the beginning of each season, then checked periodically for the various conditions which may cause poor performance. One final tip: Always carry a spare set of plugs *and a spark plug wrench* in the boat at all times. Doing so may save you a long row home. — ⚓



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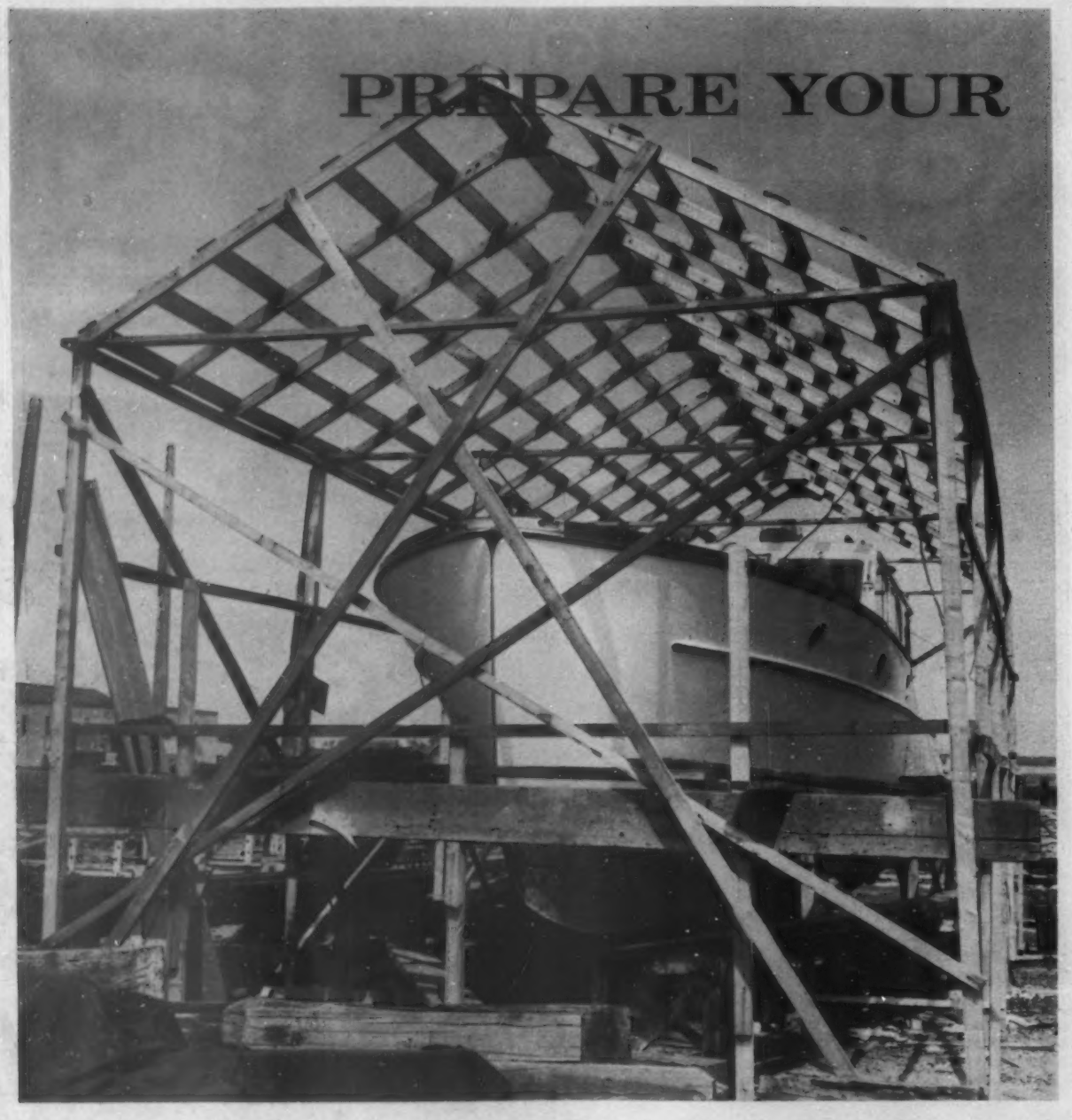

This owner knows the rewards to be reaped from giving his boat good winter protection. A heating unit inside the shed and he'll be able to work on her in cold weather.

For smaller craft: After hauling and draining all water tanks and the bilge, let your boat sit in the sun and dry out and ventilate well before covering up for good.

As soon as your boat leaves the water, thoroughly scrub and wash down the topsides and bottom.

This skipper is being forehanded by carefully cleaning and protecting the various parts of his engine.

Even though your boat is covered, weather changes require that she "breath" and stay as dry as possible.

BOAT FOR WINTER

By Tom Bottomley and Jim Munro

THERE is no inanimate object in the world as animate as a boat. How many of you haven't talked to your craft at some time or another? She's a lovely lady, and you take a great deal of pride in keeping her that way. When it's time for winter storage, whether in your own back yard or a large boat yard, she still deserves to be treated as a lady, even though you are unable to spend as much time with her as you did during the summer.

There are many things that can be done in the fall and winter to preserve both her life and beauty for many more seasons to come. Too often, people rush to get their boat hauled, and ignore the many little necessary jobs that need attention.

Start now and make a couple of lists while you're still enjoying boating weekends. One list will show all the work you want to have done during the winter, either by yourself or a boatyard. The other list will show all the equipment you'll want to add or replace before relaunching next spring. You'll save a lot of time by avoiding fitting-out crowds at marine supply stores if you make your purchases during the winter. Perhaps there's some special item that will make a good Christmas gift from the First Mate, if the proper hints are given now.

Also at this time, start removing things from your boat, such as extra foodstuffs, summer clothing, and other items no longer needed. The last weekend before hauling should be spent removing everything else that won't remain aboard during the winter: mattresses, galley gear, electronic gear. Clean each item, and check to see if repairs or replacement will be necessary. Store everything in a dry, well-ventilated place. Wrap electronic gear in protective covers to keep out dirt and moisture during the winter.

TIPS FOR SMALL CRAFT

Trailer sailors have the easiest answer to the problem of boat support during storage. Make sure that the cradle and/or rollers are properly adjusted to prevent the hull from sagging or hogging, and level the trailer bed so any water that gets into the hull will run out the drain. Boat and trailer can be stored in your garage, carport or yard, or anyplace else where there is room. If kept out in the open, provide a good winter cover. Make up a set of "bows" or a "ridge pole" to prevent water-trapping pockets from forming in the cover. Be sure the cover is vented to prevent dry rot in wood hulls.

(continued on next page)

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If necessary, write for your Thompson dealer's name.

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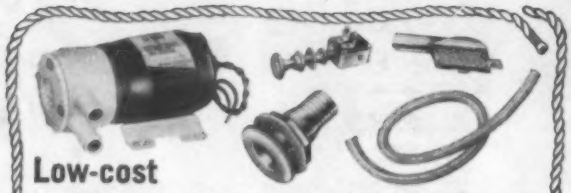

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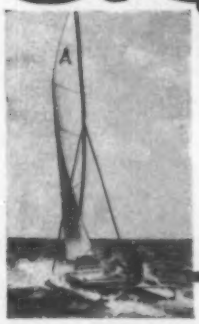

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For those without trailers, set the boat up on saw horses or blocks placed to give maximum support to the hull, and to prevent sagging or hogging strains. If you have an inboard, be sure that the hull under the engine bed has adequate support.

Before placing a winter cover on any boat, give it a good washdown, inside and out, to remove any salt particles that may be present. Salt will raise havoc with varnish as well as chrome during the winter lay-up.

Remove your outboard motor, and store it in your garage, basement, or any other place that is dry and well-vented. You can clamp it to a sawhorse, or even suspend it by chains from an overhead beam, after preparing it for the winter. To do this, flush the cooling system with fresh water and thoroughly drain. Clean and refill the gear case

Custom made covers are easy to put on and provide good protection and ventilation during the winter months.

with fresh lubricant. Drain gasoline from the carburetor, and clean the fuel filter. Remove spark plugs and pour a little lube oil in each cylinder. Replace the plugs (with new ones if needed) and wipe down the outside of the motor with an oily rag.

On small sailboats, remove the centerboard and all rigging. During the winter you can refinish the centerboard at home. If the board is iron, remove all old finish and rust. Paint with several coats of red lead, without sanding between coats. Epoxy red lead is excellent for this purpose. Fill any indentations with a good trowel cement and sandpaper them. Don't rub through any of the red lead or the rust-preventative primer. Then apply finish coats of enamel or bottom paint. Bronze centerboards can be polished and left unpainted.

When stowing spars, whether for a Snipe or a large cruising auxiliary, give them plenty of support to prevent sagging. Sail tracks should face up. When standing rigging is removed, tag the lines for easy identification, and lubricate all turnbuckles and blocks. A good varnish job now on blocks will put you that much ahead next spring.

RIGGING AND SAILS

Check all lines for wear. This includes standing rigging, running rigging, ground tackle and mooring lines. Put any needed lines on your shopping list. If you're handy and ambitious, you can use old rope to make fenders.

Deck hardware takes a beating, from exposure to salt-laden sea air especially. Remove fittings with pitted chrome, and have them re-plated. It's cheaper than buying new hardware each year. But if you've noticed that deck chocks or cleats are too small, replace them with new ones that will reduce chafe on mooring or anchor lines.

Sails should be washed, dried and stored in a well-

ventilated place. Any sails that need repairs should be sent to the sailmaker now. Also order any new sails you need at this time. You'll avoid delays in the spring.

CHECKPOINTS FOR LARGER BOATS

If your boat is too large to haul home on a trailer, you either leave it in the water (wet storage), or have it hauled into a boatyard (dry storage). Most boats are hauled at the end of the season, as it's easier to get needed repairs and refinishing done with the boat on land, particularly if the hull needs work.

When hauled, most of the weight of a boat should rest on its keel, but adequate support must be given to overhanging bows and sterns on sailboats, and to the engine bed area on power boats. Your boat must also be blocked level to permit water to run out of the bilge when the drain plug is removed.

Remember, an improperly blocked boat can lead to broken frames and a strained or twisted keel. Your concern with hull support mustn't end the day your boat is hauled, for she will sit differently during the winter as ground alternately freezes and thaws, allowing supports to shift. Check your boat frequently. Wedges between poppets and hull can be adjusted to maintain proper support.

As soon as possible after hauling, your boat's bottom must be scrubbed clean. While most yards do this for you, it is imperative that she is thoroughly clean. Then you can do touch-up painting on bare spots on bottom and topsides to keep moisture from wood or metal.

Dry rot in a wooden boat usually gets a start in the bilge, which may be poorly ventilated during the winter. Rock salt in the bilge is an effective preventive measure.

Completely drain water tanks and lines. Pump all the water out of the toilet, and sponge out any that may remain. Remove floor boards, and open all drawers and doors. Ventilate the interior as well as possible. Make sure all limber holes are clear so that if water should get in during the winter, it will drain out.

If your boat is stored out in the open, allow a couple of weeks before you have the winter cover installed. The time can be utilized in making repairs that will have to be done before the next season.

There are many who believe in wet storage, when practical. This belief is based mainly on the idea that a boat belongs in the water, not sitting on her keel. If you're going to have your boat remain in the water, put plenty of chafing gear on mooring lines, and take whatever steps possible to protect the hull against ice damage. Some owners tack scrap wood around the waterline, for example. Salt in the bilge is a good idea in wet storage, too.

WHAT TO DO ABOUT THE ENGINE

Here's where careful work will really pay off next year. Drain the engine water jacket, and remove all drain plugs from water pump, exhaust jacket and muffler. Remove all spark plugs and pour a cupful of engine oil into each cylinder. Turn the engine by hand so that oil coats all cylinder walls. Check the plugs for possible replacement. It's a good idea to start the next season with a new set of plugs in any case. Remove and clean the flame arrestor on the carburetor. Drain carburetor bowl and fuel filters. This is a good opportunity to remove and check your distributor cap, rotor, high tension leads, and coil. Remove the battery and have it put on a trickle charger. Drain the crankcase oil and fill with clean lubricant. Check your motor manual for any other steps needed to winterize your engine.

WINTER PROJECTS

Take a look at the list you've made of jobs that must be done before relaunching. You'll find many that can be done at home in evenings or weekends. This will include refinishing small items such as shelves that have been removed from the boat, or making a set of special shelves to hold new electronic gear. Any work that can be done during the winter will put you in the water sooner next spring.

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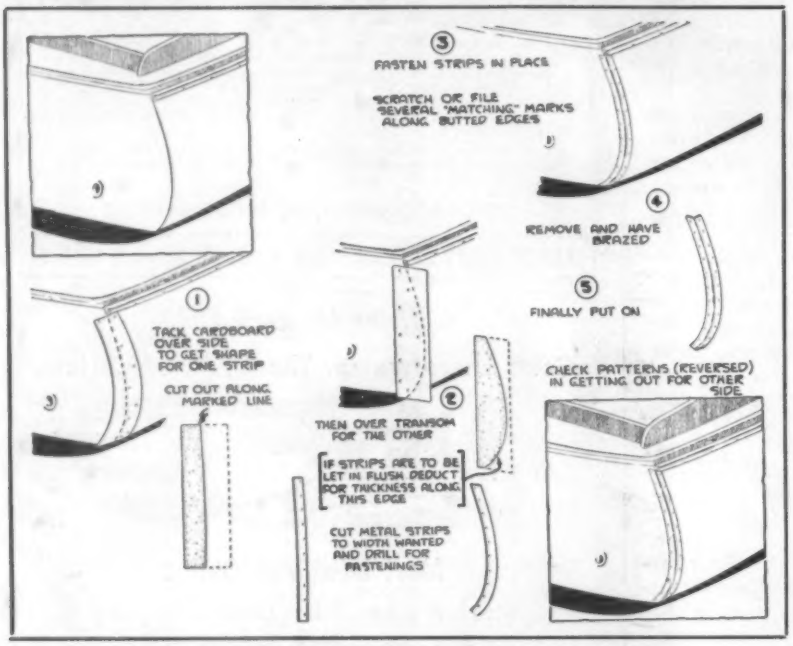
GLEN L 9152 R Rosecrans, Bellflower, Calif.

FITTING OUT with Jim Emmett

Readers are invited to submit ideas for this column. POPULAR BOATING will pay $5.00 for each item used. Send material to Jim Emmett, POPULAR BOATING, One Park Ave., New York 16, N. Y.


3
FASTEN STRIPS IN PLACE
SCRATCH OR FILE SEVERAL "MATCHING" MARKS ALONG BUTTED EDGES
4
REMOVE AND HAVE BRAZED
5
FINALLY PUT ON
1
TACK CARDBOARD OVER SIDE TO GET SHAPE FOR ONE STRIP
CUT OUT ALONG MARKED LINE
2
THEN OVER TRANSOM FOR THE OTHER
IF STRIPS ARE TO BE LET IN FLUSH DEDUCT FOR THICKNESS ALONG THIS EDGE
CUT METAL STRIPS TO WIDTH WANTED AND DRILL FOR FASTENINGS
CHECK PATTERNS (REVERSED) IN GETTING OUT FOR OTHER SIDE

HOW TO MAKE METAL TRANSOM GUARDS

Fitting metal along the edges of a transom can be costly, but much of the work involved is the sort you can do yourself at a great saving. Here's how Al Kaufman of Boston made a pair of guards.

His first step was to tack stiff cardboard over the side planking, allowing it to extend just beyond the transom. Its upper end was cut to fit against the hull's guard rail, and the lower end marked to match the boottop stripe. Finally, a line was drawn on cardboard along the transom's edge.

The first strip of cardboard was removed and a second strip was tacked over the transom. This was also trimmed top and bottom, and the transom curve marked along the inner edge. These strips, cut to the pencil lines, gave the shapes required. These templates were then clamped to the metal, in this case ⅛-inch sheet copper, and the ends and the shaped edge for each scratched in. Their maximum width (2 inches for Al's boat) was then measured and the second edge scribed on the metal.

Al did not mortise the hull sides to bring the metal in flush with the sides. Where this is to be done, deduct the thickness of the metal along the outer edge of the transom pattern, when cutting that template edge.

Check the patterns on the opposite side of the boat. Theoretically, both sides should be alike; the reversed patterns should fit. However, it's sensible to check, since even a slight difference can throw you off. Finally, with the four strips scribed on the copper, they can be cut out by a shop with a metal cutting saw. The edges are filed smooth, strips drilled for oval head screws.

Al fastened the strips in place on his boat, butting the edges together carefully, using screws only in alternate holes. He then filed half a dozen shallow identifying marks along the butted edges so the man doing the brazing could match these up. Naturally, in the finished installation, the strips should be well bedded.

1962 ENGINES (*continued*)

"M" series, are said to incorporate manufacturing economies which are reflected in engine price.

There are 20 engines in the "M" series; six are 6-cylinder models, and the balance are eight sylinders. All develop rated horsepower at 4000 rpm. In the 6-cylinder models, three are standard drive, two are designed to use outboard drives, and one is for jet drive.

In the 8-cylinder line, eight are standard, three will take out-drives, and three will power jet drives.

All engines in the M series have adjustable engine mounts, and alternators that will deliver 10 amps of direct current even at low engine operating speeds.

DEARBORN MARINE ENGINE DIV., Easton Corp. Two new Interceptor engines will be in production for 1962, according to the company, but details are not available at this time. A new hydraulic transmission will be featured next year. This compact, light-weight unit can be used on all six-cylinder and V-8 engines through 215 HP.

GRAY MARINE MOTOR COMPANY. The complete line of Gray engines for 1962 was not ready for release at press time, but will include the 215 HP Fireball V8, a 111 HP compact six-cylinder engine for stern drive or jet drive, and a 12-volt 40 amp alternator for Gray's Fireball V8's and Diesel engines.

The 215 HP Fireball features a water-heated intake manifold which provides very low-speed idling, dual temperature controls (one for each cylinder bank), separate oil coolers for engine and transmission, swivel-type water-cooled exhaust elbows which may be slanted either inboard to a single exhaust outlet or outboard to dual exhaust outlets, and a cast iron oil pan.

Gray's 111 HP Compact Six is designed so it can be dropped into place as a power package, ready to run as soon as fuel, water and exhaust lines are connected. A wiring harness is provided with plug-in terminal to complete the circuits to the instrument panel with one simple connection. Rear engine mounts can be bolted either to the transom or engine bed, and front mounts are adjustable for quick alignment.

HARNISCHFEGER. The P&H model V-463 is a new lightweight, high-speed Diesel of 135 horsepower. Use of aluminum alloy in major components, including crankcase, end housings and cylinder heads provides minimum weight per horsepower, and is said to insure dependability and long life. Rated horsepower is developed at 2800 rpm in this 2-cycle, loop-scavenged engine.

VOLVO IMPORT. A new 100 HP Volvo engine will be available in 1962. Similar in general configuration to the 80 HP engine, it has a displacement of 109 cubic inches. There will also be a hydraulic lift for the Aquamatic outdrive unit, which will enable the unit to be raised from the driver's seat. — ⚓

speed drops to 29 MPH and RPM to 4650. With three persons aboard, RPM is 4550 and speed 27 mph.

1. What would you recommend for a speed propeller, and what would be a reasonable load propeller?

2. Can I improve performance, or is this fairly good for a family boat?

3. Is it normal for a boat of this type to plane quite flat on the water as mine does? The only way I can get the nose up is to change the motor tilt position, but then porpoising occurs.

4. Some chums in the local racing fraternity suggested placing rails similar to spray rails at the water line to provide a slightly larger planing area and perhaps gain a little more lift.

Z. E. Denchak
Manitoba, Can.

The fact that your motor speed is reduced considerably with three persons in the boat would indicate that your present propeller has too great a pitch. Reducing pitch will improve performance with a three-person load. Most planing hulls will begin to porpoise when driven beyond their design speed. Since your boat begins to do this at 30 MPH, there is no point in trying to make it go faster. Therefore my suggestion about a slightly lower pitch holds for both speed and load.

Apparently you have a well-designed craft. A good hull should have a trim angle of not more than 3½ degrees when on plane. I would judge that you are getting good planing action without having the boat stick its nose in the air. A low trim angle makes for safe operation.

Don't spoil a good boat by adding "spray rails" such as you describe. If your boat required a larger planing surface, the naval architect would have designed it into the hull.

TRAILER FOR CAT BOAT

One of the virtues of the Cape Cod Cat boat (for a family of six) is its rather ample beam. I am desirous of having the largest boat I can handle with a trailer, but I am told that various state laws limit the boat width to something around eight feet. What is the maximum size (width) boat I can haul without special permits or taxes?

I would also like your estimate on the maximum size boat (up to 25 feet in length) that I could comfortably haul with a Rambler station wagon. You might also indicate names of organizations that make trailers of this size, and the approximate price range.

Jonathan M. Weaver, Capt., Inf.
APO 24, San Francisco, Calif.

The maximum width boat suitable for trailering in most states without special license is 8'0".

Your Rambler should be able to haul a 25-foot boat, provided you use

(continued on next page)

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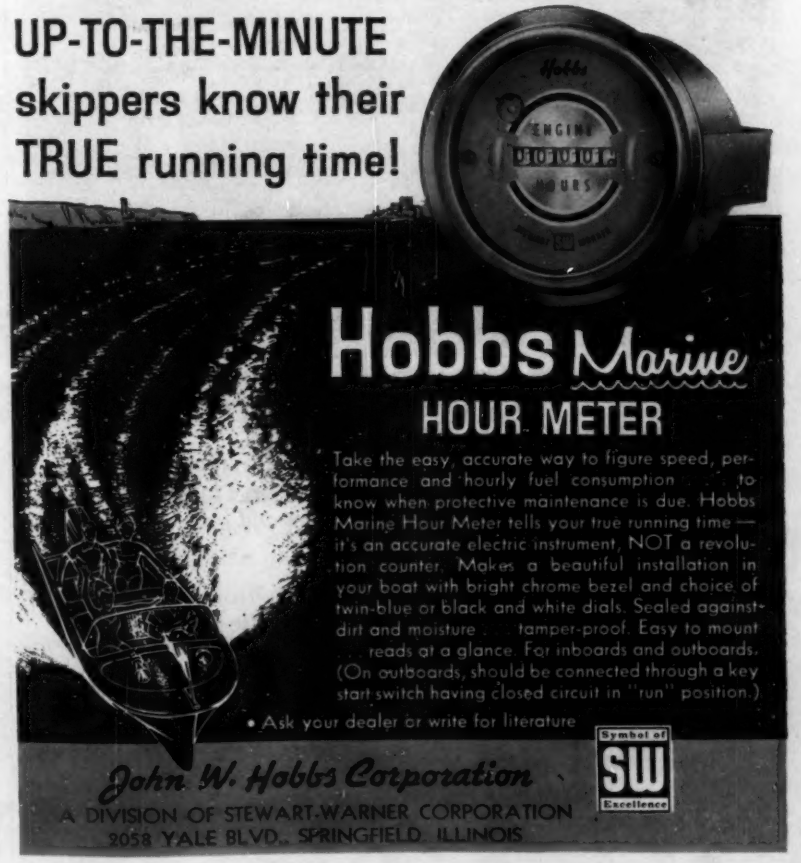

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a proper hitch; in this case an axle hitch would be best. The trailer must be set up properly so that weight at the hitch is kept within safe limits (see "Boat Trailer Hitches," by Robert Lee Behme, P.B., May, 1961 issue).

Depending on size and weight of boat you select, the appropriate trailer will cost between $250 and $600.

STERN WHEELS

I need details of stern wheel construction, operational speed and size of wheel, blade spacing, angle of thrust exerted on hull, methods of steering (which I understand is difficult), and preferred means of reducing engine to paddle speed and having in mind the probable shock factor when paddle blades strike the water.

V. L. Burkbeck
Lawndale, Calif.

The success of a stern wheel depends upon the following factors:—

1. Correct design of the hull lines at the stern.
2. Arrangement of the paddle wheel and rudders.
3. The structure provided aft for supporting the wheels.

The stern line, as a rule, is square across the vessel, in plan. The bottom will rise up under the stern on a flat curve, until it meets the deck, the sides tapering off accordingly. Success in the design of the stern is in the choice of the right buttock lines. If the design is too fine, there will be a loss of displacement and longitudinal strength. If the design is too full, the flow of water to the wheel is interfered with, the effect of which is greater going astern. For a successful working, the paddle wheel should be kept well aft, the foredge of the floats being at least 18″ from the after perpendicular, or the after end of the load water line.

Wheel speeds range from 25 to 50 rpm. The actual speed will depend on wheel diameter and the potential speed of your boat.

Wheel diameter at float centers is:
101.33 Vk/ 3.1416 N (1-s)
Vk = speed of boat in knots
N = rpm of wheel
s = slip, for which .25 is a good average value.

It will be necessary to determine the total resistance of your craft at the desired operating speed. This will be equal to the thrust required from the wheel. The thrust permits calculation of total float area and shaft horsepower required by using the following formula:

Thrust = S.H.P. X325 / Vk X A
S.H.P. is Shaft Horsepower
Vk = Speed of vessel in knots
A = Total area of floats.

Width of the floats should be about .2 of their length. They may be run just awash. In no case should the immersion of the float be so deep that the peripheral speed at the top of the float equals the speed of the boat. Floats should be of such dimensions that the thrust is not more than 250 pounds per square foot. The number of floats may be taken as one for each foot of wheel diameter.

The wheel may be driven by a Morse Silent chain from a jack shaft. The jack shaft in turn is driven by V-belts coupled to the engine. This arrangement permits speed reduction in two steps keeping belt and chain contacts at a reasonable value. The V-belts isolate the engine from severe shock. As an alternative, you may wish to use your engine to drive a hydraulic pump, which in turn drives a reversible "hydraulic motor" that is geared to the paddle wheel.

With the ordinary stern, three rudders are generally fitted immediately forward of the wheel. If properly sized, these rudders give a very powerful steering effect both ahead and astern. The rudders are usually of the balanced type. When going astern the water from the wheel is forced on the rudders, and when a boat of this type goes aground, it is possible by moving the rudders from port to starboard and back again, to cause the stern to swing from side to side so that she generally backs off.

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BOOKLETS

OUTBOARD PROPELLERS, a 24-page catalog in full color, with valuable information on theory and performance of propellers; a selector table for all makes of motors and boat sizes and types; racing props, plus boat accessories and skis. Michigan Wheel Co. (284)

COLOR STYLING gives a number of suggestions on what colors to paint topsides, decks, superstructure, bottom, and interior. Woolsey Paint & Color Co. (377)

TRICK WATER SKIING is a 24-page booklet that gives 15 different trick maneuvers executed by nationally known trick skiers. McCulloch Corp. (394)

SAILBOAT HARDWARE is listed in the Race-Lite Marine hardware catalog. Methods are suggested for rigging some one-design classes. Race-Lite (389)

GUIDE TO MARINE ROPE is a folder that explains advantages of nylon and dacron line for marine use. West Products (397)

SWIMMING RAFT CONSTRUCTION featuring Styrofoam is explained in detailed folder. Stepwise pictures show various phases of construction. Defender Industries. (395)

BUILD A FIBERGLASS BOAT gives suggestions on how to mold a small fiberglass boat. Defender (387)

INBOARD FACT SHEET lists 14 important features to look for in an inboard engine. Palmer (393)

OUTBOARD HANDLING, a guide for the use of boats, motors, and trailers. Outboard Boating Club of America (205)

OUTBOARD BOATING SKILLS, second printing of this practical how-to-do-it book. Evinrude Motors (349)

MANUAL FOR SAFE, HAPPY BOATING is a 24-page booklet giving many helpful hints on family boating. Bonadettes (398)

TAX BULLETIN is a listing of all states and the Federal Government, with their fuel taxes, together with refund information. Mobil (379)

MARINE INSTRUMENTS such as compasses, speedometers, tachometers, and clocks are shown. Airguide (396)

BOAT TRAILER BROCHURE shows tires and wheels for trailers and gives recommended inflation pressure and load capacity of many trailers. Goodrich (375)

EVERYMAN'S GUIDE to buying a boat has answers to frequently asked questions on boat purchasing. Hotaling's (388)

RULES & REGS. for numbering boats. U.S. Coast Guard (194)

LEGAL REQUIREMENTS, for boats, with safety advice. U.S. Coast Guard (196)

RULES OF THE ROAD, U. S. Coast Guard (199)

PILOT RULES, Great Lakes, U.S. Coast Guard (200)

RADIO STATION DIRECTORY, for Atlantic, Gulf and Pacific Coasts lists international and phonetic alphabet, aircraft radio range beacons and commercial broadcast stations. Bendix (345)

GAS AND OIL RECOMMENDATIONS for both inboard and outboard engines are listed in 22-page booklet. Ethyl Corp. (399)

ANCHORS & ANCHORING, a sixteen page instructive booklet extensively illustrated. All about anchoring. Danforth Anchors (13)

INTRODUCTION TO OUTBOARDING is a fact-filled booklet covering almost all phases of outboard boating for beginners. Kiekhaefer Corp. (361)

PLASTICS CATALOG lists full range of plastic items from small plastic boat to polyethylene anchors. Nautical Plastics Co. (391)

LESSON FOR LANDLUBBERS, tells all about outboard boats, including a discussion of hull design and a study of outboard motors. Glasspar (348)

MARINE ENGINES—12 TO 277 HP, is a folder covering all current Universal 2, 4, 6, and 8 cylinder engines. Universal Motor Co. (367)

MARINE FURNITURE BROCHURE illustrates wooden yacht chairs, aluminum chairs and aluminum yacht chairs. Telescope Folding Furniture (392)

INBOARD V/8 Marine Engine Literature features specifications and optional equipment that makes up the Flagship Engine. Owens (381)

PAINTING HANDBOOK for boat owners is a 35-page booklet giving detailed instructions on how to paint boats of almost every type of construction. Also has section on how to prepare your boat for winter lay-up. DuPont (362)

PAINTING GUIDE tells how to prepare your boat for painting and gives tips for better painting results. Moore (386)

INSTANT SPLICING gives detailed steps on how to make various splices including eye and back splice. Puritan (373)

CRUISING GUIDES 1, 2, 3, 4, a complete set of maps for the waterways of the United States. Mobil (374)

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BOAT CLUB BEACONS

CALIFORNIA BOATING COUNCIL REPORTS ON BOAT THEFTS

The number of boat thefts increased alarmingly during the three months of summer reports the California Boating Council of Rodeo, Calif. According to the County Sheriff Offices this was the greatest single period increase in their history.

The most frequent boat loss or theft, and the hardest to trace is the pram and dinghy. These boats are not required to be numbered. The number of reported burglaries indicate that the boat owners have been negligent in some instances. Most motor thefts are from the boat owner's own back yard. In the majority of the cases the owner has no record of the motor serial number. Some don't even know the horsepower of the stolen engine. Many burglaries reported from harbors involve expensive gear such as radios, depth finders, binoculars, compasses, and sextants. Other items such as blankets, galley equipment and clothing are also listed among pilfered items.

The Council makes the following suggestions in connection with marine thefts:

1. Report any entry or attempted entry, suspicious circumstances or license numbers of auto suspects to the local law enforcement agency. Do not attempt to apprehend a criminal yourself. Notify your harbor master of any irregularities.
2. Record all serial numbers to be found on gear and motor. Valuable articles not numbered by the manufacturer should be initialed in a concealed place on the item.
3. Remove all movable and valuable gear when leaving the boat if at all possible. If left on board, store out of sight.

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WAUKEGAN OUTBOARD CLUB ASSISTED BY CITY

The Waukegan, Ill. Outboard Club met with the Waukegan City Council in the spring of 1960 to discuss plans to improve the launching and docking facilities on the lake front bordering the city. The club was successful in getting the city to appropriate $1200 for construction which included adding 2 more concrete ramps to the existing 4 ramps, extending the docks 12 feet further into the lake and building one dock of the same length and another L-shaped dock to accommodate a great many more boats for tie up when launching or retrieving. The club furnished the blueprints and necessary specifications for the work.

Through the combined efforts of these two groups the boatmen in the area have come to realize that civic and private cooperation can result in improved boating facilities.

SMITH COLLEGE BUYS SAILBOAT FLEET

Informal sailing has been added to the extracurricular activities at Smith College in Northampton, Mass., this semester, according to Talman Bigelow, president of Sailstar Boats. He reports that Smith has purchased a fleet of 6 *Little Bears* after a two-month rental period. The *Little Bear* is Sailstar's 11½-foot daysailer, a sloop-rigged centerboarder with modified planing hull.

This is the first year that sailing has been available to Smith students. The new boats are used as trainers under the physical education department and also for informal sailing by girls who have passed their Skipper's test. They

(continued on page 120)

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sail in the Oxbow of the nearby Connecticut River. The college has also made the boats available to faculty members on a summer rental basis.

UNITED STATES POWER SQUADRONS REPORT

THE Third Annual Safe Boating Water Carnival Demonstration jointly sponsored by the Watchung Power Squadron and the Ocean County Chosen Board of Freeholders was held at Mathis Plaza, in Toms River, N. J. this past summer.

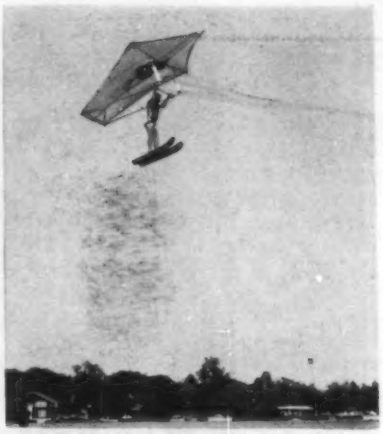
Although it rained during the morning, an ever-increasing crowd came to see the demonstration; by mid-afternoon four or five thousand people were on hand for education in safe boating flavored with some very exciting entertainment.

The U. S. Navy sent Helicopter Squadrons 2 and 4 to demonstrate the rescue of personnel and equipment from sea to air. Demonstrations were conducted to show the correct and incorrect ways of anchoring. There was a exhibition of life saving and fire fighting equipment.

Charles Hotaling of Hotaling's Boatyard welcomes Jack Leek of C. P. Leek & Sons at the Safe Boating Water Carnival held at Toms River, N. J.

The U.S. Coast Guard Auxiliary put on an interesting show by bringing an outboard motorboat on a trailer and going through the actual Coast Guard inspection to determine if the craft was properly equipped and would meet the Coast Guard requirements.

To conclude the day's exhibits the Port Indian Ski Club of Port Norris, Pa. put on an hour long ski show, completely professional in every aspect. At times there were six or more men and women towed by the same boat, and the grace of the participants delighted the spectators.



Kite flying is demonstrated by one of the members of the Port Indian Ski Club, Port Norris, Pennsylvania.

COAST GUARD AUXILIARY NOTICES

THE annual Fall Board Meeting of the Second Coast Guard District Auxiliary will convene at the Terrace Hilton Hotel in Cincinnati, Ohio on October 5, 6 and 7, 1961. District and Division Auxiliary officers of the 22 states in the Second Coast Guard District are expected to submit reports on their boating safety activities for the past year. Plans will be formulated for the future boating programs of these various divisions. In addition to the business meetings, social events are being scheduled for members and their wives. Approximately 350 people are expected to attend.

Commander Gordon L. Bates, USCG, is the new Director of Auxiliary for the Third Coast Guard District, replacing Lieutenant Commander John D. McCann who was transferred to Coast Guard Headquarters, Washington, D. C.

BOOKS FOR BOATMEN

QUEENS OF THE WESTERN OCEAN, by Carl C. Cutler. United States Naval Institute, Annapolis, Maryland. 672 pages, price is $12.50.

C. W. Nimitz, Fleet Admiral, U. S. Navy has the following to say in his foreword to the book, "The title of this prodigious work—*Queens of the Western Ocean*—is only partially indicative of the tremendous task undertaken by the author in describing the origin and growth of the American Merchant marine and its influence on the economic growth and welfare of our country. This book is actually a history of Colonial America from the earliest days of the thirteen original colonies down to the peace treaty that ended the War of the Revolution. It then continues the story of a rapidly growing America to the start of the Civil War. . . ."

This is the story of the American sailing packet ships, the businessmen who conceived them and made or lost fortunes on them, the captains and seamen who drove them through on schedule, and the buoyant spirit of pre-Civil War America which made possible the first real steps toward reliable, comfortable sea travel since the time of Columbus.

YACHTING, by Philip Kershaw. Published by Ian Allan Ltd. of London, England, and distributed by Sport Shelf, P. O. Box 634, New Rochelle, N. Y. 56 pages, paperback, illustrated. Price is $1.00.

The chief classes of sailing yachts seen in the waters of Great Britain are described briefly in this 4″ x 6″ book which also gives the reader a quick glance at the British racing scene, where over 770 clubs are recognized by the Royal Yachting Association.

A CRUISING GUIDE TO THE NEW ENGLAND COAST Including the Hudson River, Long Island Sound, and the Coast of New Brunswick. By Roger F. Duncan and Fessenden S. Blanchard, assisted by John P. Ware. Dodd, Mead & Co., 432 Park Avenue South, New York 16, N. Y. 478 pages, over 45 maps, pictures and illustrations. Price, $9.00.

The original cruising guide was published in 1937 and the authors must have been roaming the New England coast since then, for the information contained in this new edition has been greatly expanded and revised. Much new material has been added—over 50 new harbors since the previous edition. Like the fourth edition, it includes the Hudson River to Lake Champlain. It also covers the Bay

(continued on next page)

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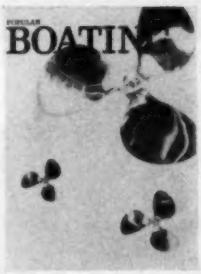

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BOOKS *(continued)*

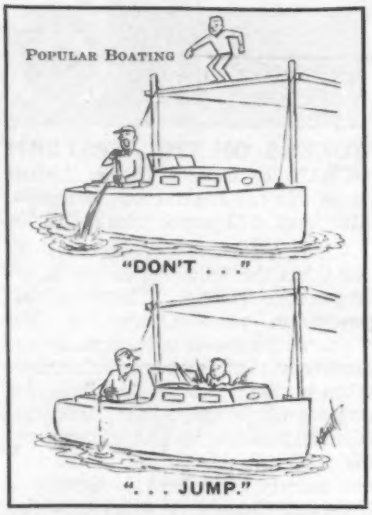
of Fundy, including the remote and fascinating island of Grand Manan. Most of the harbors have been revisited in person by the authors. Others have been revised from information received from men on the spot—yacht club commodores, boatyard officials and other specialists.

The book is costly, but it should be included among the gear to be taken along on an extensive cruise of the New England coast.—G. L.

BOATS, BOAT YARDS AND YACHTSMEN, by Henry Van L. Baay. D. Van Nostrand Co., 120 Alexander St., Princeton, N. J. 264 pages, illustrated, priced about $6.00.

The author has built and repaired all kinds of boats from sculling boats and racing shells to power and sailboats up to 60 feet in length. He was 9 years old when he began working in his family's yard in Holland where his ancestors had built boats since 1754. In addition to operating a yard, he has owned a yacht charter company and held title to more than a score of yachts, the largest being a 58-foot schooner.

It is this experience that the author has drawn from to write his book. He relates his personal encounters with the world of boating in a way that will benefit the reader. His anecdote about hiring a deckhand off the docks will serve as a warning to anyone who plans to hire an additional hand. The reader will find the book practical as well as entertaining.



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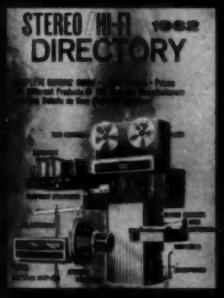

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